EMERGENCY EVACUATION MANAGEMENT REQUIREMENTS AND CONCEPTS

FINAL REPORT

CONTRACT NO. DCPA01-79-C-0253

FEMA WORK UNIT 2312-H

May, 1981

SYSTAN

Detachable Summary

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6 EMERGENCY EVACUATION MANAGEMENT REQUIREMENTS AND CONCEPTS

by:

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for

Federal Emergency Management Agency
Washington, D.C. 20472
Contract No. DCPA01-79-C-0253
FEMA Work Unit 2312-H

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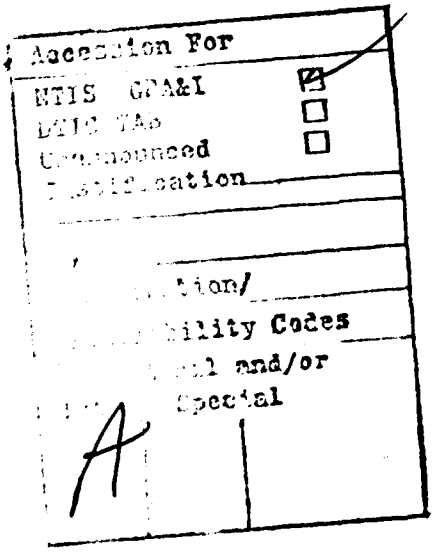

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DETACHABLE SUMMARY

RESEARCH FINDINGS AND RECOMMENDATIONS

S.1 SCOPE OF RESEARCH

The major objective of this research effort is to assist the Federal Emergency Management Agency (FEMA) in developing and evaluating emergency evacuation management requirements and concepts. FEMA planning guidance, emergency organization plans and operations, other research studies, and recent disaster events were analyzed to determine management requirements, procedures and limitations. A second objective was to develop a "Guide for Emergency Evacuation Management and Operations" directed primarily to local officials who might be faced with an evacuation condition without prior plans or experience. The Guide has been distributed separately.

S.2 PRESENT EMERGENCY ORGANIZATIONS

Present emergency organizations and management systems have evolved to meet the hazards of recurring disasters. As the nation's society and economy have grown more complex and more interdependent, emergency response systems have also grown. The systems, based on graduated response to hazard impact level, have served well. The nation has not been subject to nuclear disasters nor to the cumulative effect of simultaneous lesser disasters.

The present management system to mitigate the effects of disaster may be characterized briefly as follows:

- There is a triad of responsibility between federal, state and local governments.
- Local jurisdictions have basic responsibility for handling "moderate" disasters within their areas.
- Should the disaster extend beyond a local jurisdiction, or should it become of greater magnitude than the local people can handle, the state becomes involved by coordinating and providing resources. Should the disaster reach proportions that overwhelm local government, the state may assume operating responsibility.

- The federal government normally acts in a coordinative and supportive role. For disasters of catastrophic impact and very wide extent, the federal government may assume control, although this possibility is considered remote. Some system of shared responsibility is more likely.

- Many public and private organizations at all levels of operation have traditional and legal roles. These organizations direct and control local operations that do the actual work.

Research and extrapolation of experiences with natural disasters indicate that the United States has sufficient resources, capabilities, and technical knowledge to cope with the hazards of all disasters. The task of this research is to highlight potential management system deficiencies for emergency evacuation, recognizing that exceptional capabilities may exist in some areas of the country.

S.3 ROLES OF LOCAL, STATE AND FEDERAL ORGANIZATIONS

Local officials of risk and host area jurisdictions consider (quite properly) they are adequately prepared to deal with "moderate" emergency hazards within their areas. This has led to the concept and procedure for planning and operations which implies a succession of responsibility and authority from local to state to federal agencies as the severity of the disaster escalates.

During three recent major disaster events (Three Mile Island, Mississauga, and Mt. St. Helens) which involved actual or potential evacuations, federal and state agencies were quickly and directly involved in local operations. In each case, the technical expertise and operating capabilities of areawide organizations were vital to local decisions and operations. In each case, officials at all levels found appropriate roles and means of support and coordination despite deficiencies in planning and preparedness. The effectiveness of the many organizations involved in these events was varied and is difficult to evaluate. In retrospect, there have been recriminations and cited short-comings. It appears that the response to these events could have been more effective if there had been a preplanned central emergency management structure.

A logical hierarchy of decision control relates the scope of the decision to the level of management. The degree of change in operations depends on the severity of the disaster, with centralized controls increasing as the hazard increases. Although the normal structure of essential

business and government functions is continued and extended into the evacuation period, many policy decisions will have to be made or reevaluated at all levels of control. This requires an effective feedback from local operations to higher-level decisionmakers, so they can efficiently mobilize and allocate resources and coordinate functions. Rapid, efficient and authoritative promulgation of higher-level decisions will be vital to local operations.

There is a remote, difficult to define, possibility that nuclear war or nuclear material accident conditions, or a simultaneous cumulation of lesser disasters could require nationwide large-scale emergency evacuation of risk areas. It is possible that the present organizational structure, based on the concept of graduated response, could be overwhelmed by a breakdown of middle- and top-level decision capacity. Then chaos would prevail.

S.4 EMERGENCY EVACUATION PLANS

The entire subject of economic and monetary controls and procedures is fraught with uncertainties for local officials. Economic and fiscal procedures for accounting and paying for resources and supplies are expected to be defined by higher-level directives. It can be assumed that no one will be denied the essentials for lack of money, and that the expenses incurred by businesses, governments and other institutions preparing for and implementing evacuation will be financially redressed through a variety of federal actions. (While no policy has been enunciated, it is believed that in the real case any federal proclamation requiring evacuation would also address such topics as fiscal liability/responsibility, public use of private assets, and use of government employees outside of their home jurisdiction.) However, it is unlikely that specific state and federal policies will be announced prior to evacuation, so local officials may be required to conduct initial operations according to their own judgements.

Local organizations consider themselves largely in a response position to directions from higher-level organizations for large-scale emergency evacuations. There is a sharp disparity in attitudes of local officials between disasters of local "moderate" impact and those of greater impact. A survey of public officials' attitudes about disaster preparedness in California (for earthquakes) revealed that local managers use moderate magnitude earthquakes as the basis for emergency planning. They do not feel that planning for a large magnitude event is worthwhile because it is improbable and there is little they can do about it. A study of simulation training exercises presented nuclear war and earthquake crisis buildup scenarios to local

officials. They were confident of their plans and capabilities until the crisis exceeded local capabilities, then there was the expectation that federal or state government would assert positive leadership, motivate the public, and issue emergency directives. In other words, local officials assume responsibility for emergency operations within their jurisdictions, and subject to control by their emergency operating forces. They do not feel responsible for plans or decisions to deal with areawide or more severe disasters, particularly if the type of disaster is outside their experience.

Full-scale, all-hazard plans are obviously an attractive ideal. But they are seldom achieved: they are expensive, require constant updating and must be adjusted to the particular event. They generally reflect routine organization operations and relationships, and are too abstract and ponderous for rapid response to immediate threats.

Public response, particularly the nature of spontaneous evacuation, is a significant uncertainty for emergency operations. Nuclear crisis relocation planning is predicated on the assumption that the total risk area population will move to host areas under the direction of government officials. Once in the host areas, all of these people will be cared for by the host government. This assumption is justified as a "worst case" condition, so any lesser requirement is a bonus.

Many local officials consider the major problems for evacuation are the population groups, like rest home patients, who need special care and handling. These operations require detailed, difficult to obtain, data. It is difficult to know the number of aged and infirm in private homes. These special population groups were major problems during the Mississauga and TMI disaster events. To many local officials these classes of problems appear more important and difficult than the movement and reception and care of the general population.

S.5 MIDDLE MANAGEMENT CENTER

Analyses of emergency requirements and capabilities reveal both the lack of and need for coordination between host area, risk area, and regional public and private sector management personnel. During the field test at Jackson, a local official summed the meeting "the most important weakness of evacuation planning and operations is that no one is in charge." A middle management center (MMC) could coordinate the activities of each evacuation/reception (E/R) area and function as a clearinghouse for intelligence and as a decisionmaking body for the allocation of E/R area

personnel and resources. Though the center would act primarily as a "command post," it might also assume operating responsibility for tasks outside the usual scope of local government. The center would also serve as a focal point for contacts with state and federal government agencies.

The nation would be divided into several hundred areas based on existing risk/host conglomerates and economic/trading area definitions. Many existing state and regional organizations are based on similar geographic, economic, and political areas. A MMC would be formed for each E/R area. The MMC should be sited to ensure physical protection and communication capacity. Ideally, it would be located at the population and transportation centroid of the E/R area outside of probable hazard risk areas.

The MMC concept involves the decentralization of policy-level management authority and personnel to E/R areas, with the authority to make, promulgate and implement decisions, and with the capability to communicate both intelligence up and policy decisions down to local governments. The degree to which decisions are shifted to higher organizational levels is directly related to the degree to which operating personnel are unaccustomed and unable to deal with problems. This applies to resource allocation, coordination, and support operations. The MMC would be delegated authority to act for federal and state governments, and to coordinate private organizations in all matters internal to the E/R area. It would be responsible for preparing and disseminating public information, for upgrading and constructing protective shelters, and for coordinating RADEF operations.

The MMC staff would include representatives from local jurisdictions and essential federal, state and industrial organizations. The representatives would coordinate intelligence and operations for jurisdictions on a functional basis. Operations would be managed from the usual headquarter sites. The higher-level decision structure would continue, with coordination by federal, regional and state headquarters. If the E/R area were wholly within one state, a state official might be in charge; if the area overlapped state boundaries, a federal official would be in charge. However, each official would have authority over functions within his purview.

Essential local operating units and organizational structures should be maintained (not dispersed as "fillers" for host organizations), except for those (e.g., schools) whose clientele were completely dispersed. Host area organizations would manage increased demand by expanding operations with auxiliary personnel from the host area and relocatee population. This would be accomplished on a

self-help, best-effort, training-on-the-job basis. Specialized risk area operating units would be maintained intact, to meet risk area needs or to be dispatched (at host area request and MMC direction) to offer contingent support.

It would be difficult to implement a middle management center system under present conditions and attitudes. In summary, the fundamental difficulties for implementing a comprehensive emergency management system include:

- Lack of concern at all levels of government because disasters are viewed as transient, temporary aberrations, with limited significance to ongoing operations.
- Disasters are considered local, particular events to be countered by individual, specific programs.
- The impact of crisis or disaster events requires an unpredictable readjustment of management relationships at all operating levels. Top-level predisaster activities are onerous administrative burdens to local day-to-day operations. Hence, disaster preparedness is considered irrelevant.

It should be noted that these difficulties are pervasive, not isolated to any particular emergency management system.

Should FEMA decide to implement a management system to cope with the deficiencies, it appears that a feasible course would be to develop cadre elements to be deployed as coordinating units for disasters of sufficient magnitude to require emergency evacuation. The cadre elements should embody the authority of federal and state governments, and should assume the major role of coordinating agency and areawide organization support to local areas. They should confine their activities to policy-level decision coordination, resource allocation and support functions. They should not attempt to direct local operations. In no sense should they be required to justify their existence on a cost/benefit basis. Rather, they should be an integral part of the general government overhead burden.

While disasters are infrequent at local levels, they often recur on a national basis. The systematic employment of cadre management units would provide a significant and continuing experience base for all elements. (Staff would be drawn from existing agencies.) Initial conflicts of authority with specialized ongoing operations would be brought to light, and could be ironed out. There would be a unified display of top-level federal and state support to local operations. This might impact legislators and voters sufficiently to engender higher levels of support for

disaster preparedness. It might also alleviate the contingent criticisms (as the Three Mile Island case) of lack of federal capability to deal with crises. It appears that the only feasible way to implement such a program is for FEMA to assume leadership through subordinate units considered relevant and prestigous. Active support to initiate the system should be sponsored by groups such as the Fire Academy program for the hazardous materials.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This final report described the development of emergency evacuation management concepts.

FEMA planning guidance, emergency organization plans and operations, other research studies, and recent disaster events were analyzed to determine management requirements, procedures and limitations. Several tasks were involved:

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- Present emergency management capabilities were investigated to determine the status of organizations, hazard conditions, and plans and operations.

- Emergency evacuation operations were analyzed at host area, risk area and state and federal levels.

- Management requiremeents were determined for the various jurisdiction levels during the basic, movement and maintenance phases of emergency evacuation.

- Emergency evacuation management requirements were compared to capabilities and deficiences were noted.

- Recent major disaster events involving actual or potential evacuations were analyzed to learn differences between doctrine and practice.

- Field tests were conducted with local government officials to explore and validate research findings, and to test the applicability of the Guide.

- A middle management center concept for large-scale emergency evacuations was developed and related to requirements. The feasibility of implementing the concept was explored.

- Results of the analyses and field tests were evaluated and are incorporated in this final report.

PREFACE

This is the final research report for the Federal Emergency Management Agency (FEMA) Contract Number DCPA01-79-C-0253. The work is part of a continuing research effort (Work Unit 2312-H) on emergency operations management by the FEMA Research and Mitigation Program. A second report, "Guide for Emergency Evacuation Management and Operations," has been submitted separately. The Guide is directed primarily to local officials who might be faced with an evacuation condition without prior plans or experience.

Robert A. Harker, the principal investigator, was responsible for the project design and its overall performance. Allen E. Wilmore contributed operations insights to the evaluation of organization requirements and capabilities, and was the moderator for the field tests. He was also the principal author of the Guide.

The Contracting Officer's Technical Representative (COTR) during the initial project planning was George C. Van den Berghe of the Defense Civil Preparedness Agency. The contract was transferred to FEMA and James W. Kerr, Director of Technical Hazards Research assumed the role of COTR. Both Mr. Van den Berghe and Mr. Kerr contributed to the conceptual development. Mr. Kerr further assisted by providing input data and critically reviewing research developments. State and local officials were extremely helpful during the field tests in reviewing the contents of the Guide and contributing their insights to emergency management requirements. The authors express their gratitude to all who assisted in this research endeavor.

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EMERGENCY EVACUATION MANAGEMENT

REQUIREMENTS AND CONCEPTS

1. RESEARCH SCOPE

1.1 OBJECTIVES

This project is a part of the Federal Emergency Management Agency (FEMA) continuing research program on advanced emergency operations concepts for civil preparedness and mitigation, and for emergency population relocation. The research and reporting is divided into two parts: one part concerns the development of management concepts and evacuation procedures; the second part concerns preparing an Emergency Evacuation Guide for local officials.

This report covers the research procedures, findings and recommendations developed under Contract No. DCPA01-79-C-0253, as modified. The general contract statement of work calls for a study of field conditions of host area, risk area, state and federal agencies middle management, and to prepare, validate, test and modify if warranted an Evacuation Field Manual. (The "Guide for Emergency Evacuation Management and Operations" is a separate publication.) Specific work and services, as specified in the contract and the RFQ, are:

- "Investigate the coordination and management problems of host areas, bearing in mind the real need for alternatives in possible solutions.

- "Indicate what can be done by the local and by the imported population. List what resources can be contributed locally and which ones need to be procured or acquired from elsewhere.

- "Develop further evidence regarding the requirements for a middle management level center for host area support from parent risk areas and from State and Federal agencies. Test this evidence by field experiments, local observations, and interviews or any other applicable scientific method.

- "Investigate the potential of risk areas in human and material resources in order to determine the contributions to be made to host areas. Establish and compare the risk/host area interfaces in selected geographic locations in order to facilitate the design

of a pattern of exchanges in the triad of host, risk, and management center components as hypothetically envisaged and in a crisis situation.

- "Refine the concept of the middle management center through readjustments of dimensions or otherwise component parameters and carry out enough iterations of this process to make possible results of a near finite nature. Test and validate these findings and demonstrate the advantages, physical, psychological, organizational and operational, of these middle level centers.

- "Using preliminary findings, establish the role of the EOC in people and natural resources management while relocation is in progress or in a static posture.

- "Integrate all the findings of the research above and others from parallel studies and prepare a field manual of host area management intended mostly for local planners and area operational staffs. This manual should cover all activities taking place in host areas from the time of crisis inception and preliminary reception of relocatees through arrival, registration, assignment of quarters and duties, performance, physical and social involvements, spiritual and welfare functions, and all other activities designed to make life tolerable in host areas for both the indigenous and imported populations during an undefined and probably protracted length of stay.

- "Validate and test this manual for acceptance in host areas to be chosen by the Government and modify it if warranted by circumstances."

The approach to the study of evacuation management is outlined in Section 1.3 of this chapter. The overall report describes the study content and conclusions. Specific tasks of the contract scope of work are reported as follows:

- Host area management problems are classified by functional areas in Chapter 3 and Appendix C.

- Local actions and resources are explored in Chapters 2, 3 and 4 and Appendices A, B and C.

- Requirements for middle management support for host areas is summarized in Chapters 4, 5 and 8, and investigated in Appendices A and B. Field tests are reported in Chapter 7.

- Risk/host area interface is the subject of Chapters 3 and 4 and Appendices B and C.
- Middle management center concepts are described, developed and refined in Chapter 8.
- Emergency Operating Center (EOC) roles are derived from the analyses of requirements in Chapters 2 through 5 and included in the conclusions of Chapter 8.
- The findings of this research and parallel studies are incorporated in the Emergency Evacuation Guide (published separately).
- The field tests of the manual are reported in Chapter 7.

1.2 BACKGROUND

This research effort was initiated by the Defense Civil Preparedness Agency (DCPA) shortly before DCPA was incorporated in the new FEMA structure. The FEMA Mitigation and Research program emphasis is broader than that of DCPA: It is involved with preparedness, mitigation and response to national emergencies ranging from natural and manmade disasters to nuclear attack. This study of evacuation management requirements and procedures has been adapted (within the contract objectives) to FEMA's broader role. In most considerations, the requirements for nuclear attack crisis relocation typically represent a "worst case" basis for evaluating evacuation management problems. The implications of the nuclear crisis case are explored in Chapters 2 through 5.

Semantic difficulties of Agency reference for this report have been resolved by the simple expedient of using FEMA to include all present and past civil defense activities (except, of course, published references such as report titles).

FEMA is continuing its research program to develop concepts and methods for improving emergency evacuation planning and operations at the local government level. Current crisis relocation planning guidance is contained in a Planning Guide (References 1, 2 and 3). Part C of the Planning Guide deals with risk and host area planning, and includes procedures for making housing and feeding arrangements, providing public emergency service support, planning logistic and economic controls, and establishing fallout shelters. In addition, a body of research studies deals with individual functional areas, including reception

and care, public safety, medical and public health, food, transportation, utility services, and the like. Extensive materials have been developed for upgrading fallout shelter facilities and operations. These sources provide a wealth of basic technical data for this "Emergency Evacuation" research study. In addition, the crisis relocation planning projects completed or underway for states and risk and host areas are of particular benefit to the research effort.

To supplement the planning effort, FEMA has also prepared self-help training materials for use by local government either during a crisis buildup or during the crisis itself. For example, a "Planners' Guide for Crisis Relocation Training Workshops" (Reference 4) was designed to assist local organizations to rapidly develop effective crisis response plans, and to indoctrinate local management personnel through workshop exercises. Workshop exercises and simulation training are an effective means for introducing planning concepts and materials, and for initiating the planning effort with local executives. The exercises are also an effective way to present and evaluate the coordination and management concepts for this study.

A recent study of host area management concepts (Reference 5) provides important background material and conclusions relevant to this study of evacuation management. It was determined that, because of the magnitude of the impacts of relocated populations on the host area, local host area civil defense and emergency service officials cannot be expected, by themselves., to perform all essential operations. They may have to rely on outside personnel and resources, drawn from government and private organizations from the risk areas. Some supplemental support may be available from state and federal government agencies and from public utilities and other areawide organizations. Current planning visualizes that the supporting personnel and resources will move to host counties, and will be subject to local jurisdictional control. Allocations will be managed at the state level.

During the research analyses and discussions with local officials, it became clear that more thought and effort must be devoted to the roles of target cities and to their relationship with the host areas. A major conclusion of the "Crisis Relocation Management Concepts" research study (Reference 5) was that there is need for an intermediate level of coordination and control for each relocation area (the risk areas and their associated host areas). This concept is compatible with current FEMA investigations of communications and EOC support for crisis relocation. An important consideration is to recognize the need for a flexible approach to crisis relocation management to "customize" organizational structures according to local conditions.

The latest evacuation research and planning guidance has advanced to enumerate the tasks required in host areas, to identify responsible persons and organizations, and to outline schedules of recommended activities. These involve a broad spectrum of activities to be performed by heterogeneous groups, under leaders often unfamiliar with their roles and environments. There is an urgent need to investigate and devise risk and host area management and coordination concepts and to establish operational procedures. There is a need to explore the probable availability and quality of intelligence, as well as knowledge of material resources and skilled labor that will be available to officials during and following evacuation. This research investigation is designed to assist in understanding the pervasive requirements for risk and host area management, coordination, and direction. Based on this understanding, the "Guide for Emergency Evacuation Management and Operations" should make evacuation planning more complete and more acceptable to local officials.

1.3 RESEARCH APPROACH

The research was divided into several tasks, structured to meet the study objectives, incorporate prior research findings and planning guidance, and effectively use the experience of the research team.

Task 1: Analyze Coordination and Management Problems. As indicated in Section 1.2, extensive materials have been generated relevant to risk and host area crisis relocation planning, training, and operations. These materials were surveyed to determine management objectives, functions and requirements. The capability of local officials to meet evacuation requirements was assessed. These assessments led to specification of the coordination and management problems to be addressed by the research.

Task 2: Develop Alternative Solutions. The problems were then defined in terms of management requirements. Personnel and resources normally available in risk and host areas were compared to projected evacuation requirements. Deficits and management problems were identified. Risk/host area interfaces were identified, and comparisons were made between various types of geographical areas.

Task 3: Identify Sources of Resources and Personnel. The essence of the solutions to evacuation management problems lies in the selection and scheduling of activities and in the allocation of scarce material resources and skilled labor on a regionally cost-effective basis. The problems of constructing, equipping and providing sufficient

improvised or expedient fallout shelters will be a major problem in most relocation areas. The allocation of evacuees and host area residents to the facilities will require significant management efforts. Though there may be a general surplus of manpower in the host area, efficient and effective shelter-upgrading operations will require local ingenuity, engineering and management skills, as well as careful allocation of building materials, construction equipment, and skilled labor. These must be provided primarily from regional and risk area sources.

Task 4: Define Roles for the Middle Management Center. The coordination and management capabilities of risk and host area officials while relocation is in progress will be largely saturated by immediate population movement and reception control problems. A centralized intelligence and decisionmaking center will be needed to coordinate and adjust plans to fit the particular circumstances of the relocation. As evacuation achieves a more static posture, the coordination problem becomes vital for resource allocation.

The study of crisis relocation management concepts (Reference 5) concluded that a relocation area middle management center was vital to coordination between risk and host areas, and with state and federal governments (except in the more sparsely populated regions of the nation). In general, the middle management center would adjudicate the jurisdictional and allocation issues, and would be responsible for extraordinary crisis relocation functions including intelligence, warning, public information, construction of expedient public fallout shelters, and areawide RADEF operations.

Task 5: Draft Evacuation Guide. The findings of Tasks 1 through 4 were integrated with existing local disaster experience and the findings of parallel research studies to form the basis for the Emergency Evacuation Guide. The guide is directed primarily toward local host area operations and planning personnel who might be faced with evacuation reception before they had developed full-scale plans. Middle management center concepts are incorporated to include risk area, state, and federal support roles. As specified in the research objectives, the guide covers emergency evacuation crisis relocation activities during crisis inception and preliminary reception of relocatees; it extends to arrival, registration, and assignment to quarters. Both the indigenous and relocated populations of the host areas are considered for an undefined but probably protracted length of stay.

Task 6: Field Tests. The objective of Task 6 was to develop a program to test the middle management center concepts and procedures of the Guide, and to conduct test

exercises to validate and expand the materials. The first effort was to develop a format for the test exercises. This format included the steps typically associated with local government field exercises:

- Explanation of emergency evacuation rationale and policy;
- Description of the background and objectives of the study;
- Presentation of the Guide and its relation to local management problems;
- Discussion of existing local plans versus emergency evacuation requirements;
- Exploration of proposed middle management concepts and procedures versus perceived local problems; and
- Exploration of host and risk area capabilities to provide management staff.

Steps 1 through 4 were designed to indoctrinate local officials on the background rationale and requirements for management planning. Steps 1 and 2 were purely introductory material to provide the necessary background for the participants. The degree of detail included was determined on the basis of the experience of the risk and host area audiences. In Steps 3 and 4, the discussion is to direct the attention of the audience to the Guide and to local management problems (without any attempt to evaluate existing plans). Step 5 was designed to introduce the proposed concepts and to elicit responses from local officials. The final step was included to investigate the perceived ability of officials to adapt staff and other resources to management-level functions. Throughout all six steps, the related problems of risk and host area officials were considered to ensure a coordinated review and definition of the total management problem.

Task 7: Final Host Area Field Manual. The findings from the test exercises were evaluated to validate the middle management concepts and the Emergency Evacuation Guide, and this report and the Guide were appropriately modified.

Task 8: Final Report. This final report includes the research methodology, findings, and recommended areas of further FEMA investigation. It also includes the revised specifications for the middle management coordination and management procedures.

2. EMERGENCY MANAGEMENT CAPABILITIES

2.1 EMERGENCY OPERATING STATUS

The overall FEMA program is directed toward assisting state and local governments to improve their readiness for life-saving operations and mitigation of damage resulting from natural and manmade disasters and nuclear attack. FEMA has two basic strategies for protecting populations threatened by major hazards. One is to provide the best protection possible with the population "in place" at or near their homes, schools and places of work if the warning time is short. The second is for people to leave the threatened area if time allows. The latter involves the orderly evacuation of people from high-risk areas (areas likely to be directly affected by hazards) to low-risk host areas (and their reception, care and protection in the host areas).

Though it is generally accepted that all state and local jurisdictions should be capable of conducting coordinated operations during major emergencies, it is also generally accepted that most local jurisdictions have limited capabilities to prepare special countermeasures for all contingencies. Some elements of emergency responses are susceptible to basic plans and operations. The basic emergency operating capability should encompass all essential forces and resources available to the jurisdiction. These elements should be incorporated into a single emergency operating doctrine for planning economy and efficiency, to achieve standard and effective operation and coordination procedures, and to allow simple and unambiguous communications between the many individuals and organizations affected. Thus, a basic emergency operations plan should be drawn which defines the local emergency organization and responsibilities. It covers required system functions, such as the capability for direction and control by key officials, including staff, communications, and facilities. The ability to warn and to provide emergency information and advice to the public is included. The plan should also cover in place and emergency evacuation operations, defining the responsibilities of essential organizations.

The federal government has developed Federal Regional Centers within each of its regions. Some of these are in underground facilities, designed to withstand substantial

hazard effects and equipped to maintain independent operations over an extended period of time. Their function is to coordinate federal activities for survival and subsequent recovery (e.g., receive and transmit warnings, predict hazards, prepare situation reports). They also serve as communications links with state governments and central federal facilities.

Coordinated operations are also required by states and local jurisdictions. For this reason, the federal government has promoted the development of state and local EOC's by providing financial assistance (matching funds) for development and construction costs. Primary justification for these facilities was for use in the event of nuclear attack, although state and local governments often use them during peacetime emergencies such as hurricanes, large-scale fires, and floods. The federal government also funds the RADEF program, and contributes to other equipment and operations costs.

In addition to basic emergency plans and operating centers, local emergency plans should deal with the various types of emergencies the locality may experience. Risk area operations are obviously different between the in place and evacuation countermeasures. Evacuation also requires different host area responses. The problems associated with doubling or quadrupling the host area population may strain the area's ability to provide in place shelter, and may involve different control and resource allocation strategies.

It is apparent that both in place protection and emergency relocation contain elements and characteristics that are applicable to conditions resulting from both natural disasters and military emergencies. For example, in place protection is needed for natural disasters with short warning periods, such as tornados or flash floods, as well as for the effects of nuclear attack. Evacuation is applicable in areas threatened by hurricanes or floods, as well as during a developing nuclear crisis.

Some characteristics, however, differentiate wartime disasters from natural emergencies. Natural disasters are usually site-specific: they involve a single contiguous area rather than the entire nation. In many cases, the intensity of natural hazards is limited, or at least can be estimated with relatively high confidence. Likewise, the duration of the emergency can usually be estimated. In the nuclear attack situation, risk areas are distributed nationwide and are subject to potentially catastrophic effects. Residual radiation may require fallout shelters in both host and risk areas. Nuclear crisis conditions may be of indeterminate duration, and may be resolved without actual nuclear exchange.

2.2 PRESENT EMERGENCY MANAGEMENT ORGANIZATION

Modern recognition that civil defense is a function of federal government was established by Congress in the Federal Civil Defense Act of 1950 (50USC App. 2251-2297) as amended.

> "It is a policy and intent of Congress to provide a system of civil defense for the protection of life and property in the United States from attack." (Reference 6)

The Act further states that civil defense is a joint responsibility of federal and state government (and, by extension, of local government). Subsequent amendments and executive orders have expanded the federal charter to include natural and man-made disasters.

A long legacy of traditional and legal practices antedates the 1950 Act. Local fire, law enforcement and health agencies are structured to deal with "moderate" disasters at the local jurisdictional levels. (The definition of "moderate" tends to be vague, typically indicating a level of disaster with which local forces can cope with minimal outside support.) Military bases have traditionally supported adjacent civil populations. National guard units, either under state or federal control, have been used for disaster mitigation, control, and relief, and to provide personal and property security. Support to civil authority is an active military concept. Flood control has been a common partial justification for the construction of major dams. The Federal Bureau of Investigation and the Treasury Department have been active in suppressing crime and drug control (not normally classified as disasters, but impacting larger segments of the population than traditional moderate disasters.) The prestige and financial resources of federal organizations have provided a basis for significant impact on the policies and procedures of local organizations.

The Red Cross has a special congressional charter directing it "to carry on a system of national and international relief in times of peace and to apply the same in mitigating the suffering caused by pestilence, famine, fire, flood, and other great national calamities." The national organization is located at Washington, D.C., with regional headquarters. At both the national and regional levels, a disaster services staff is frequently dispatched to a disaster scene to provide administrative and supervisory personnel to assist local chapters. In large operations, national personnel often supplement local personnel. In disaster-prone areas, such as the Gulf Coast hurricane areas, personnel may be moved into the threatened area prior to impact. In addition to its emergency functions, the Red Cross has a continuing responsibility for rehabilitation assistance.

Other religious, welfare, and private organizations provide significant relief and assistance. Strictly speaking, the Salvation Army is not a disaster relief organization. But in disasters it is often involved in many activities, such as emergency feeding, shelter and clothing distribution; recording and identifying victims and survivors; and providing religious and case work services. In many communities, churches and the Salvation Army have a quasi-official relationship with the police and fire departments, and as a matter of routine provide many types of help.

Since 1950, a plethora of federal and state environmental and regulatory agencies have been created: Regulatory and control directives and procedures have been vastly expanded. The Labor Department's Occupational Safety and Health Administration (OSHA) is a typical example. Most of these organizations are not specifically identified with disaster functions, but each has legal requirements that have a potential impact on emergency operations. Though it is normally assumed that general emergency proclamations by the President or state governors will override specific agency powers, the practices and procedures have become ingrained to local operations, and each essential operating organization will have to interpret its potential organization and personal liabilities.

Since 1960, the emphasis of the federal civil defense program has been to assist state and local government -- financially, technically, and administratively -- to protect their residents from the dangers of nuclear war and radioactive fallout. The national fallout shelter survey (NFSS) was initiated in 1961 to identify potential fallout shelter areas in all public and private buildings (excluding single-family dwellings). Over 230 million fallout shelter spaces were identified, licensed, and marked as public fallout shelters, and many were austerely stocked with federally procured supplies. There is no longer a national stocking program, and most stocks have deteriorated and been disposed of. Other necessary components of a nationwide civil defense system were developed, including warning and communication networks, radiological monitoring capabilities, packaged disaster hospitals and state and local EOC's. The present effectiveness of the components is varied and difficult to measure.

State and local governments expanded their civil defense programs to include protection from natural and other peacetime disasters. Community shelter plans (CSP) were developed to use the shelters identified in the NFSS, along with public information and instructions on where to go and what to do for in place protection. These plans also covered home basements and expedient shelters in case public shelters

were insufficient to house the population. Although most jurisdictions have CSP's, many have become obsolete and discredited by the passage of time and personnel, and the changing perceptions of disaster cause and response. State and federal priorities and funds have also varied over time and by area. A national shelter survey (NSS) continues to identify additional fallout shelters, as well as structures in risk areas that would also provide some protection from the direct effects of a nuclear attack.

During the early 1970's, the concept developed that a nuclear attack would very likely be preceded by a period of international tension or crisis, providing time for emergency evacuation. This led to the distinction of high-risk and low-risk areas (Reference 7) and to the crisis relocation program (CRP). CRP is presently an active planning program under federal sponsorship.

During the 1950's and 1960's, many states adopted legislation giving broad emergency powers to state government and setting up emergency response procedures for both war and peacetime disasters. For example, many states have emergency resource plans that impose control and "freeze" orders on the distribution of essential resources. All states and most communities are required by law to have some form of emergency preparedness organization to direct or coordinate disaster activities. The state organizations are often associated with national guard units.

Superimposed on these traditional, general-purpose disaster organizations are federal and state agencies and commissions created to deal with specific disaster hazards. A community preparedness program for weather-caused disasters was administered by the National Weather Service, Department of Commerce. A Federal Flood Insurance Program, including hazard reduction programs, was under the Federal Insurance Administration of the Department of Housing and Urban Development. An earthquake reduction program was created under the Office of Science and Technology of the Executive Office of the President. Several of the federal disaster oriented agencies have been incorporated into the FEMA organization. Organizations have also been created at state levels; for example, the California Seismic Safety Commission to deal with earthquake disasters.

Dynes and Quarentelli of the Disaster Research Center at Ohio State University produced an excellent overview (Reference 8) of disaster operations based on the study of over 100 community disasters during a seven-year time span (1966 to 1972). A major thrust of the report is to identify and dispel significant misconceptions of individual and organizational behavior during disasters. This is important because the misconceptions are often "embedded in planning

and are frequently the basis for specific decisions during disaster operations." The report will be cited frequently in Section 5.2, Comparison of Present Organization Capabilities with Requirements.

The rationale and history of the development of present disaster response organizations and their operations is relevant to the present study, particularly at the local level, because the status of present emergency organizational structure and management systems reflect this evolutionary development. When any new or modified concepts of operations or management system is conceived and analyzed, it faces the legacy of existing procedures and organizational prerogatives. Present organizations have attributes and legal precedents that have been demonstrated over time to be feasible and effective. Thus, it is incumbent on the analayst to justify the necessity and benefits -- and political and operating feasibility -- of proposed modifications.

The present management system to mitigate the effects of disaster may be characterized briefly as follows:

- There is a triad of responsibility between federal, state and local governments.
- Local jurisdictions have basic responsibility for handling "moderate" disasters within their areas.
- Should the disaster extend beyond a local jurisdiction, or should it become of greater magnitude than the local people can handle, the state becomes involved by coordinating and providing resources. Should the disaster reach proportions that overwhelm local government, the state may assume operating responsibility.
- The federal government normally acts in a coordinative and supportive role. For disasters of catastrophic impact and very wide extent, the federal government may assume control, although this possibility is considered remote. Some system of shared responsibility is more likely.
- Many public and private organizations at all levels of operation have traditional and legal roles. These organizations direct and control local operations that do the actual work.

2.3 WARNING TIME

Because of the importance of warning time to protective measures, it has become a common classification practice (Reference 9). Disasters typically classified as occurring without warning include:

- Earthquake
- Fire
- Flash flood
- Hazardous material accident
- Transportation accident
- Terrorist action

Disasters that may be classified as preceded by some warning period include:

- Civil disorder/riot
- Epidemic
- Pollution episode
- Flood
- Tsunami
- Tornado
- Storm/hurricane
- Landslide
- Volcanic eruption
- Dam failure
- War

Disasters preceded by a relatively long warning period allow an active response, with emphasis on warning, public information, short-term mitigation, alerting emergency services and potential mutual aid providers, and decisions on in place or evacuation countermeasures. Disasters preceded by relatively short warning periods may require pre-identification and designation of shelters, short response warning systems, and security maintenance. Flexibility is required to implement a remedial evacuation should damage, fire, toxic materials, or fallout prohibit maintaining the population in the shelter posture. Disasters without warning require long-term, passive protective stances, such as improved building standards, facility siting, and fire protection measures. Earthquakes are often considered typical of this condition.

For the purposes of this study, a meaningful distinction between disasters is whether the inherent nature is such that it leads to taking in place shelter or to emergency evacuation. For example, a tornado warning might allow time for population relocation, but the nature of the hazard precludes differentiation of high-risk from low-risk areas; hence, the feasible countermeasure is in place protection. An incident involving hazardous materials, such as a train accident releasing chlorine gas, would typically occur without warning; however, the area subject to the contaminant could be identified, and there could be adequate time before the gas spread to achieve population evacuation. Another classification difficulty is illustrated by earthquakes: disasters without warning. The initial damage, principally building collapse, causes secondary damage such as fire (as in the San Francisco case) or dam fractures (as in the Los

Angeles Van Norman dam case). This secondary damage may require remedial relocation.

By their nature, disasters with warning times adequate to allow population evacuation involve uncertainties that may be so great as to preclude reliable evaluation and decisions. For example, hurricane warnings involve long-range weather prediction and storm-tracking activities. Nuclear crisis relocation involves judgements of enemy intentions, capability, and timing. Though strategic war is presently classified as with warning, the possibility of a preemptive strike remains. The costs of disruptions resulting from nationwide evacuation are considered so high that it could be initiated only by presidential directive, with the concurrence of state governors.

Thus, disasters that are likely to be preceded by warning involve uncertainties, since for practical purposes, warning requires both technical systems and organizations sensitive enough to predict the event, and response systems to react to the prediction, make judgements, and issue warnings. For disasters caused by human actions (terrorist attacks, civil disorders, and war), the opportunity to warn the public is also subject to the tactics of the instigators. The later analyses of emergency evacuation management systems must be influenced by possible or actual uncertainties facing operating officials at all government levels during the crisis phase. As a general rule, it is apparent that the greater the uncertainties, the greater the need to hold more contingent units in more flexible reserve positions. In other words, organizations should not commit all their resources until the full impact of the disaster is clear.

2.4 CLASSIFICATION OF DISASTERS

Classifying disasters by warning time is of limited use for study of emergency evacuation operations. The classification in Exhibit 2.1 is tailored to management systems requirements. Nuclear (as for power plant and logistical system accidents) hazards are separated from other hazardous materials because of their differing effects.

Disasters typically classified as preceded by warning assume that adequate time is expected to allow evacuation (or other countermeasures) before the impact of the hazard. It also assumes that the nature of the warning is sufficiently definitive to distinguish high-risk from low-risk geographical areas. Adequate detection, identification, and dissemination systems are assumed. These qualities do not necessarily accurately predict the severity or extent of the impact, duration, or secondary effects. (Typically, longer disaster warning times embody greater uncertainty.)

EXHIBIT 2.1

CLASSIFICATION OF DISASTERS

CLASS I: No warning, moderate impact, short duration.

Fire	Transportation accident
Flash flood	Terrorist incident
Explosion	

CLASS II: No warning, areawide impact, intermediate duration, with related effects of fire or pollution.

Earthquake	Hazardous materials

CLASS III: Warning, moderate impact, short duration, with related effects of floods or fires.

Tsunami	Landslide
Tornado	Dam failure
Civil disorder/riot	

CLASS IV: Warning, areawide impact, intermediate duration

Epidemic	Flood
Pollution episode	

CLASS V: Warning, regional impact, intermediate duration, with related effects of flood, pollution, and epidemic.

Hurricane/storm
Volcanic eruption
(may be Class VI)

CLASS VI: Warning, regional impact, indeterminate duration, with related effects of local fires, radioactive fallout.

Nuclear materials accident
Terrorist incident
(nuclear weapon)

CLASS VII: Warning, national impact, indeterminate during, catastrophic related effects.

Nuclear war crisis

All disasters have potentially catastrophic impacts on the immediate victims. For the classification of Exhibit 2.1, concern is with the number of victims and the geographical extent relative to normal countermeasure capabilities. "Moderate" indicates that the disaster is confined to a (or several adjacent) jurisdictions and that local forces (supplemented by limited outside resources) can adequately mitigate the effects. "Areawide" indicates wider effects (metropolitan areas, statewide, etc.), requiring significant levels of outside support. "Regional" extends the area and the level of support. "National" means that all regions of the country may be affected, and that all essential resources will be involved.

The duration of the disaster is taken to mean not only the time of the hazard impact, but also the time for the effects to subside to a sufficient degree to begin recovery and restoration operations. Mitigation operations may be conducted during the disaster impact period (e.g., levees may be reinforced during a flood). "Short" is a duration of 48 hours or less. "Intermediate" extends from two days to one week or ten days. "Indeterminate" means that the expected effects may last for an indefinite period, requiring emergency operations to be established in a manner to be sustained permanently.

Related effects from disasters vary in severity, as do the primary hazard impacts. They are noted in Exhibit 2.1 when they are likely to affect emergency operations.

A final significant characteristic to distinguish between disasters is their frequency or recurrence, which allows emergency organizations to develop and gain experience with effects and countermeasures. With dry humor, the general directer of the International Atomic Energy Agency was cited as saying that the nuclear-power industry needs more accidents to gain the experience to prevent future mishaps. "It's expensive, but that's how you gain experience" (Reference 10). Only with epidemics (in recent history), nuclear materials accidents, and nuclear war crisis relocation is experience unavailable at the national level. Terrorist actions involving nuclear weapons are a potential, imminent threat (Reference 11). However, by the nature of the subject, most local officials have limited experience with most types of disasters.

As with many classification systems, once they are established special conditions and exceptions arise. Forest fires and the Southern California fires during the Santa Ana winds, may be areawide and of intermediate duration. Many of the disasters classified as with warning can be unwarned events because of detection system failures (landslides, dam failures, volcanic eruptions, or nuclear power plant

failures). It may be questioned for the Los Angeles fire case whether the combination of large fuel loads and hot, dry, windy weather conditions provides warning (there is a high correlation and a sophisticated response -- FIRESCOPE -- system). Obviously, almost all incidents can conceivably be of greater or lesser impact. The classifications of Exhibit 2.1 serve the research goals by establishing typical degrees of hazards and countermeasures, and providing a convenient short-hand reference system. Consideration of the hazard classifications reinforces the concept of uncertainty for emergency response systems. Disasters are destabilizing forces; any disaster combination may escalate in severity and area; most local disasters produce environments prone to related, secondary disasters; simultaneous disasters may balloon the cumulative hazard levels and areas.

3. EMERGENCY EVACUATION OPERATIONS

Civil defense planning guidance and supporting research studies provide a wealth of information relevant to emergency evacuation operations. Though most of these materials are specific to nuclear war crisis relocation, they also relate to some aspects of all disaster operations, and tend to cover a "worst-case" condition. Appendices A, B and C are drawn from the guidance (References 1, 2 and 3) and research materials; they deal with state, federal and areawide, risk area, and host area emergency evacuation operations.

Sections 3.1 through 3.3 of this chapter summarize Appendices A through C. The format is structured to allow derivation of an integrated statement of management requirements by functional categories (e.g., law enforcement, traffic control, resource supply). The statement of management requirements for emergency evacuation (Chapter 4) is in general terms, focusing on the nuclear war crisis relocation disaster. The implications of disaster conditions to management requirements are explored in Chapters 5, 6 and 7. Alternative management systems for emergency evacuation are the subject of Chapter 8.

3.1 FEDERAL, STATE AND AREAWIDE OPERATIONS

A fundamental requirement of all essential organizations is to maintain their integrity, to survive, and to operate under emergency evacuation conditions. This involves a secure headquarters to control essential organization elements in a decentralized mode. Effective communications are needed to ensure essential data for decisionmaking and for promulgation of decisions to operating personnel. Lateral communications are also required to associated essential organizations. A special emergency requirement is to maintain a warning detection, identification, and evaluation system sufficient to serve the decisionmakers. There must also be a warning promulgation system capable of eliciting desired responses from subordinate units.

During a major emergency evacuation, state and federal organizations will be required to determine economic and fiscal procedures, control mechanisms, and audit functions. An evacuation may require modification of normal procedures, practices, and interorganizational responsibilities (e.g.,

public safety, highway load limitations, and medical practices). Government officials should be prepared to decide to what extent rules should be changed, and to ensure that the changes are within legal emergency powers. It will be difficult to communicate these decisions to operating personnel and to achieve the appropriate responses while assuring limited personal liability.

Federal, state and areawide organizations typically have limited special forces attached to headquarters operations. These forces usually include the ability to support top-level management with information, communications, security, and logistic support. They tend to have relatively few personnel and resources, but by their attachment enjoy a prestigious role; thus, they are well qualified to control and coordinate other elements, and to act as contingent reserves. These forces include the federal Defense and Agriculture Departments, the FBI, and special engineering agencies; the state national guard, fire, police, health, justice, highway and welfare agencies. (Military and national guard organizations (Reference 12) are exceptional cases; they have extensive personnel and resources, but other commitments may limit their availability.) Private organizations tend to have few such agencies, but they may have security, control and audit units.

In addition to participating in emergency evacuation operations, the central organizations must act in a decisionmaking role to support local operations. They decide which goods and which organizations, industries and institutions are essential, and the extent of available resources. They estimate the redistribution of population, and the resulting demand for essential services and resources; they then specify who gets how much of what.

For law enforcement, fire and medical support, state and federal government organizations have limited facilities and personnel under direct control. They must determine during which time phases of the evacuation these are used in committed or contingent roles to support local area operations. Some supplies and equipment may need to be allocated at the central level. To a limited degree, the state can control licensing and relax regulations and procedures.

To support local food and medical supply operations, the state would determine geographical area requirements based on estimates of the extent of population relocation. It would then determine available reserves, and the capabilities of the production and distribution systems. From this intelligence, it could select consumption rates and operating systems. The final step would be to establish procedures and select organizations to operate the system.

For electric power support, the state would be required to inform the utility companies of the magnitude and extent of the population and organizational relocation, and to determine and promulgate nececessary conservation measures. It is assumed that the federal government would control primary fuel production and supply, and that the state would control wholesaler and distributor supplies. Each would establish allocation system procedures to control supplies and limit consumption as necessary. For natural and liquified petroleum gas, the state might invoke consumption controls. If necessary, the state could allocate coal to public utilities.

The role of the state in supporting local health services would be to assign its health personnel and facilities to alleviate local contingencies. It may be necessary for the state to allocate technical personnel and supplies normally under local control. There may also be shortages of personnel and remedial chemical supplies for sewage disposal, maintenance of potable water, garbage and trash disposal, and vector control.

Most construction and general-use materials, supplies, spare parts, and equipment are stored in privately owned, specialized facilities. Engineers, skilled technical personnel, and operators must be matched to the available supplies. The state may be called upon to allocate experienced and skilled personnel and organizations, as well as resources, among local jurisdictions. It may also need to establish distribution priorities and expediting systems. The federal government may impose high priorities on defense-related production, which will need to be integrated with civil requirements.

Food and related items are expected to comprise the bulk of materials to be transported. The role of the state will be to allocate, coordinate, and control transportation resources among the various claimants. Allocation problems for specialized transportation equipment and personnel are likely during the evacuation movement and maintenance phases.

Federal and state organizations will require telecommunications between their agencies, and with local governments and essential industries and institutions. They will also need to allocate and ensure communications between related and adjacent industries and jurisdictions. Means to interconnect telecommunications systems and to control the integrated network are required.

Both state and local governments will need communication networks to inform the public of emergency measures. Emergency public information will include advising the public of the disaster and informing them of the selected

countermeasures at the time of the emergency. Government agencies and essential industries and institutions will be warned and informed by normal and emergency telecommunications networks. These will also be used to direct the activities of operating employees. The general public and non-essential organizations must be reached by mass media communications. Printed materials, supplemented by radio and television broadcasts, are the most effective means of communication. Groups requiring public transportation will need specific information on pick-up points and schedules. Federal, state and local officials should be capable of communicating directly with the public to provide authenticated information on disaster conditions and countermeasure effectiveness.

3.2 RISK AREA OPERATIONS

Essential risk area organizations include city and county governments, their emergency agencies, and vital industries and institutions. The risk areas will include many of the headquarters for federal, state and areawide private organizations. The general operational plan for nuclear crisis relocation envisions that the decisionmaking officials of essential risk area organizations will operate from protected facilities (as an EOC) within the risk area, will commute as essential workers, or will relocate to alternate headquarters outside the risk area. The choice of alternatives will depend on an assessment of hazards, the particular role of the essential organization, and the conditions of the headquarters and alternative facilities. The clearinghouse activities of the headquarters are vital, and must be preserved. In disasters of limited geographical extent, the usual practice for private organizations is to transfer responsibilities and personnel to alternative headquarters sites in non-risk areas. These headquarters then assume responsibility for operations in the affected risk and host areas. This solutions may be impractical for wide-ranging disasters such as nuclear crisis relocation.

In many respects, the roles of essential risk area organizations are similar to those of federal, state and areawide organizations. Their primary responsibility is to maintain organizational identity and integrity, to perform clearinghouse functions, and to direct operating units. They must provide for control of their essential organizational elements in a decentralized mode, within both the risk area and the host area. They must maintain surveillance, identification, evaluation and decisionmaking capabilities, as well as a warning system capable of eliciting the desired responses from their subordinate units. This will require communications sufficient to ensure essential data is

available to decisionmakers, and that decisions are transmitted to operating personnel. They will also require lateral communications to other essential organizations and to higher-level organizations.

A significant distinction of risk area organizations from federal, state and areawide organizations is that they typically control substantial essential forces and resources. City and county officials control police and fire agencies, engineering and public works, and (directly or indirectly) trash collection, medical facilities, and school and welfare systems. In addition to their decisionmaking capacity, private risk area organizations and institutions exercise direct operating control over the majority of the nation's manufacturing, service, and distribution capabilities. They also store and control the major inventories of the nation. Large operating facilities may also have significant resources in terms of fire and police forces, food facilities, and waste disposal (Reference 13).

During the movement phase of an emergency evacuation, the public safety forces -- police, fire and emergency medical services -- of the risk area governments will be committed to directing and controlling the movement of people, supplies and equipment from the risk areas. Force levels will depend on factors unique to each disaster and risk area: the number of people leaving and remaining in the area, the number and size of essential operations, and the judgement of risk area public safety officials.

Major operations of law enforcement agencies will include expediting traffic flow, enforcing traffic restrictions, detecting and correcting traffic problems, controlling the movement of priority traffic, and assisting at the scene of automobile accidents. They will be responsible for the security of essential organization facilities and key individuals, will monitor movement and operations, and will report status information to other officials.

During the movement phase, the fire services will be required to detect and suppress fires, which may increase because residences and non-essential industrial facilities may be vacated without adequate safety precautions. In addition, the risk area fire services may be called on to conduct rescue operations, to provide pre-hospital emergency medical aid, and to suppress vehicle fires.

The major risk area medical operations will be devoted to directing the relocation of institutionalized patients and handicapped persons, as well as supporting their initial host area reception. Emergency medical care will be required in the risk area, in addition to health care for

non-transportable patients. Another responsibility will be to provide mobile medical support along evacuation routes and at risk area rest areas. Risk area hospitals operating during the evacuation could provide emergency medical care during the movement phase.

It will be prudent during the movement phase to continue to supply food, drugs and gasoline to the relocating people. Many retail store employees and service station attendants may be expected to be among the first to evacuate. Therefore, emergency demands would have to be met by extended hours of the remaining personnel at available operating outlets.

During the maintenance phase, risk area operations will be organized around clusters of essential operating facilities. A staging area will serve each cluster and provide on-shift feeding, emergency medical care, vehicle refueling, emergency repairs, and general support to risk area operations. Access control points to the risk areas will serve as a second set of operating facilities, and will limit entry to the risk area, provide transportation support, and act as secondary bases for public safety forces.

Although the intent of emergency evacuation is to depopulate the risk areas, a substantial number of people are likely to remain. These will include workers in essential industries and operations, those people who cannot be moved for medical or other reasons, and those who are unwilling to move. The total number of "stay-puts" cannot be determined in advance, because it will depend on the nature of local emergency operations and on individual perceptions of the feasibility or necessity of evacuation. While some states have mandatory laws, many officials consider it difficult and impractical to force people to leave their residences (see also Reference 14).

Public safety operations may be reduced substantially during the maintenance phase, but will depend in part on the number of stay-puts. Law enforcement agencies will be required to implement policies such as curfews and restrictions on the distribution of food, fuel, and other resources. The police will also be responsible for the security of sensitive and essential facilities, and of private property. Though people-initiated fires should be reduced, those fires that do occur can be expected to be more severe. Both police and fire forces will be required to support essential industry operations. Most medical activity will be conducted in host areas, but at least one major risk area hospital should be operational to care for immobile patients and patients requiring highly specialized care.

Essential industries and resident facilities in the risk areas will need continuing supply support. Risk area officials will be required to implement the allocation and distribution activities dictated by higher echelons of government. Most essential operating facilities depend on local or regional suppliers for materials, replacement parts, and services. During the maintenance phase, personnel will be required who are competent to respond to urgent needs, are knowledgeable on the locations of essential materials and equipment, and are capable of accessing statewide resources when necessary.

Protection from hazards in risk areas can be provided by the shelter inherent in existing structures, upgradeable structures, and expedient shelters. In most risk areas, the stay-puts and key workers could be located in existing shelters that offer adequate protection. Though identifying higher and lower risk area sections is uncertain, it would be prudent to locate expedient shelters (in the event any are needed) on the periphery of predicted risk areas, within a short travel distance from essential operating facilities.

3.3 HOST AREA OPERATIONS

The first two sections of this chapter noted that federal, state, areawide and risk area organizations have primary responsibilities for making decisions on the allocation of resources during emergency operations. In addition, the risk area organizations have especially large reserves of essential operating personnel, resource inventories, and productive capacity.

In contrast, host area organizations are required to assume primary operating responsibility for sustaining populations, typically two to four times their resident number. The primary production and initial processing of essential raw material and food industries are often located in rural areas. Host areas may have large inventories of essential commodities (e.g., crop storage or bulk petroleum facilities) located within their area, but they are usually under the control of external authorities.

The extraordinary host area requirements during emergency evacuation to support the relocated populations (Reference 15) will tend to saturate operating capacities. Though some needs can be met by supplements from the general relocatee population and from risk area and state resources, basic operations must be controlled and provided by indigenous host area organizations. These operations include provision of lodging and feeding of the relocated population and support operations such as traffic control, medical care,

and fire and police services. Carefully drawn pre-emergency plans and special training will significantly improve operating capabilities, but host area officials will be uncertain as to the extent, duration and severity of the emergency and the kinds and magnitude of external support available. Therefore, host area officials will be forced to operate on a self-help, ad hoc basis, while maintaining the flexibility to adjust to unforeseen future developments. To achieve this condition (like their counterpart areawide and risk area organizations), host area officials must maintain their security and the capability to conduct viable operations.

Civil defense policy in nuclear crisis relocation is to house the relocatees in public congregate care facilities rather than in private residences. This approach ignores experience and research indicating that many of the relocatees would move to private homes of relatives or friends; it anticipates the most severe burden for host area reception and care. An initial function of host area officials should be to encourage and facilitate the placement of relocatees in private residences. (This subject is discussed at length in Chapter 6.)

For relocatees housed in public congregate care facilities, the principal responsibility of host area officials will be to:

- Receive and register the evacuees;
- Provide housing and feeding facilities; and
- Provide necessary services and facilities for the aged, infirm, and other populations needing special support.

Some local areas have plans for in place shelter, and many have locally derived emergency evacuation or reception plans based on past experience with natural disasters. Analyses of responses to natural disasters lead to the conclusion that most host areas could rapidly designate congregate care and feeding facilities. Manpower requirements for these functions are extensive and, except in the most general terms, have few counterparts in our society. However, limited specialized technical knowledge is required so additional manpower could be recruited from the relocatees. It is probably infeasible to consider maintaining trained, designated organizations. Although reception and care would be a difficult problem for host area officials, it would probably be manageable on a self-help, self-training basis. For contingencies, resources from areawide and risk area organizations could be committed on a unit support basis for short periods under the direction of host area officials.

During the movement phase of the evacuation, traffic control personnel will assume control of the relocatees upon entrance to the jurisdictions, and will route them to reception centers. Host area forces will also cooperate with state highway patrol forces to control egress from major arterials, to provide services at rest stops and refueling points, and to clear highway accidents. In contrast to reception and care personnel, law enforcement staffs are trained, experienced and coordinated on a day-to-day basis, and thus will be better able to handle evacuation movement and control. Though evacuation movements will test the capacity of the emergency forces, both research and experience with past natural disasters indicate that movement direction and control can be carried out efficiently.

During the maintenance phase, the large increase in host area population will expand medical and law enforcement requirements, and will create special problems for fire protection and control personnel. In many areas, it is likely that the host jurisdictions can establish public safety support, with augmentation by local auxiliary personnel. State and risk area public safety forces could be used as contingent reserves to respond to special host community emergencies.

Providing medical support during emergency relocation will present substantial problems for host area officials. Most host counties are deficient in health care resources compared to urban areas, even for their indigenous population. The concentration of large numbers of relocatees will probably increase the incidence of disease. It is expected that risk area physicians and nurses will relocate to host areas and be assigned to medical facilities there, and that host area officials will accomplish last-minute arrangements for the utilization of appropriate facilities and personnel to meet special needs. It is hoped that the loss of efficiency resulting from the relocation could be compensated for by deferring non-critical medical treatments. Added requirements for public health measures in host areas could be met by augmenting risk area and state personnel and resources.

Host area resource and supply operations differ from emergency service operations in two ways: (1) most resources and supplies are privately owned and controlled, and (2) the criticality of the operation is vitally related to the extent and duration of the emergency. Should the hazard be limited in extent, adequate supplies will be available in adjacent areas. If the emergency were short in duration, adequate supplies could be diverted from resupply pipelines. Moreover, in the short duration case, consumers could adapt and reduce their consumption to fit available supplies.

Drugs, pharmaceuticals and other health supplies will move through normal channels. Quantities and types of these articles should be based on the estimated total population. Security will be required for scarce or dangerous health supplies and for specialized equipment. Any modification from normal supply patterns will require decisions by higher authorities.

Food and related products will be delivered by normal suppliers to normal retail outlets or consumers. Major food chains, wholesalers, and institutional suppliers will continue to supply their normal outlets. Food distributors who do not normally supply host area outlets constitute a flexible source with which to accommodate unexpected requirements.

Electric power, fuel, long-haul transportation, communications, and other essential supplies and services will be allocated at higher government levels. Host area officials will be responsible for implementing any decisions to limit consumption.

The entire subject of economic and monetary controls and procedures (Reference 16) is fraught with uncertainties for local officials. Economic and fiscal procedures for accounting and paying for resources and supplies are expected to be defined by higher-level directives. It may be assumed that no one will be denied the essentials for lack of money, and that the expenses incurred by businesses, governments and other institutions preparing for and implementing evacuation will be financially redressed through a variety of federal actions. [While no policy has been enunciated, it is believed that in the real case any federal proclamation requiring evacuation, would also address such topics as fiscal liability/responsibility, public use of private assets, and use of government employees outside of their home jurisdiction.] However, it is unlikely that specific state and federal policies will be announced prior to evacuation, so local officials may be required to conduct initial operations according to their own judgements.

Host area organizations will require telecommunications support (Reference 17) not only as part of the network to areawide organizations, but also for coordination of their increased internal operational loads. They may also need direct communications with adjacent areas. An earlier research study (Reference 5) indicated that local host area officials consider this a major deficiency in existing relocation plans. They anticipate the need for public information support to assist in dealing with relocatee populations. Local instructions and information can probably be handled by printed media and radio and television broadcasts, if supported by risk area facilities. However,

general information on the nature and consequences of the disaster and the countermeasures being taken by federal and state agencies must be the responsibility of higher government echelons.

For most emergencies, emergency evacuation itself is the countermeasure against the hazard. However, for nuclear powerplant failure, the spread of toxic contaminants or a nuclear war crisis, host areas may require shelter to enhance protection for both the indigenous and relocated population. Faced with a potential radiological fallout hazard, each community would have strong incentives to upgrade shelter protection to the maximum extent possible. Normal construction activities in host areas will generally cease at the time of relocation, so personnel, equipment and supplies could be diverted to upgrading existing fallout shelters or constructing expedient shelters. Except for those resources already in host areas and under the control of local organizations, it is expected that construction capabilities will be allocated by state government officials. Though technical assistance may be available from federal and state officials, local governments will be responsible for supplying the technical skills, equipment, materials and labor needed to upgrade fallout shelters.

RADEF is considered an acute problem by many host area officials. They typically assume that technical personnel, supplies and equipment would be supplied by state and risk area governments.

4. EMERGENCY EVACUATION MANAGEMENT REQUIREMENTS

The preceding chapters (and Appendices A, B and C) have presented materials drawn from civil defense research and planning guidance (References 1, 2 and 3) to define and rationalize emergency evacuation operating requirements for host areas, risk areas, and federal, state and areawide organizations. In this chapter, the relationships between these jurisdictional requirements are analyzed for basic, movement and maintenance phase operations. The requirements are generalized to apply to many disaster conditions, and biased toward a "worst-case" condition (i.e., a disaster extending over wide areas of the country, with potential catastrophic effects and of indeterminate duration). Chapter 5 will compare emergency evacuation management capabilities with requirements.

4.1 BASIC OPERATIONS

A set of fundamental and pervasive requirements for essential emergency evacuation operations are largely independent of the nature, extent or time phase of the hazard. This set includes requirements to maintain organizational integrity, give warning, conduct operations, determine economic responses, provide operating communications, and communicate emergency information to the public. Exhibit 4.1 lists these operations and indicates the requirements for host area, risk area and federal, state and areawide organizations. (The abbreviations and shorthand notations in the exhibit will be explained paranthetically in the following discussions.)

An obvious primary requirement for all essential organizations is to maintain their ability to function during emergency evacuation conditions. Key personnel must maintain overall control of operations. They will require secure facilities and adequate logistical support. (In the exhibit, direction and control -- D&C -- refers to the top-level political decisionmakers of the jurisdiction. Organizations refer to both public and private essential operating organizations.) Some organizations, as law enforcement and reception and care (R&C), are directly subordinate to direction and control officials. Direction and control organizations may directly control operating units, or may use them to provide support to other organizations. This

EXHIBIT 4.1: BASIC OPERATIONS FOR EMERGENCY EVACUATION

BASIC OPERATIONS	HOST AREA	RISK AREA	FEDERAL, STATE & AREAWIDE
Organizational Continuity			
Personnel and Facilities	D&C and organizations activate EOC and subordinate headquarters.	D&C and organizations activate EOC and alternative headquarters.	D&C and organizations move to EOC and alternative headquarters.
Security and Logistical Support	Law enforcement controls operations, risk area and areawide committed support units.	Law enforcement controls operations, areawide committed support units.	Law enforcement controls operations, National Guard and military support units.
Operations Control	Organizations direct and control operations.	Organizations direct and control operations. Allocate and delegate resource control.	Organizations direct and control operations. Allocate and delegate resource control.
Warning			
Detection, Identification and Evaluation	D&C monitors local hazards.	D&C monitors local hazards.	D&C monitors local hazards.
Countermeasure Selection	D&C implements decision.	D&C implements decision.	D&C makes decision.
Notification	Organizations disseminate warning.	Organizations disseminate warning.	D&C informs host area, risk area, and public.
Operations			
Intelligence	D&C and organizations collect, evaluate and report.	D&C and organizations collect, evaluate and report.	D&C and organizations collect and evaluate.
Decision Making	D&C and organizations determine local operations.	D&C and organizations determine local operations.	D&C and organizations determine overall policies and procedures.
Decision Promulgation	Organizations direct and control operations.	Organizations direct and control operations, Support host area organizations.	D&C and organizations direct and control operations. Monitor and support host area and risk area organizations.
Economics			
Fiscal Policy	Organizations enforce procedures.	Organizations enforce procedures.	D&C devises measures and procedures.
Payments and Accounting	Organizations enforce procedures.	Organizations enforce procedures.	Devise measures and procedures.
Controls	Organizations enforce procedures.	Organizations enforce procedures.	Support host area and risk area operations.
Operating Communications			
Requirements	D&C and organizations determine internal, and adjacent host area and risk area.	D&C and organizations determine internal, and adjacent host area and risk area.	D&C and organizations determine internal, and host area and risk area areawide.
Systems	Organizations control local operations.	Organizations control local operations.	Organizations control system operations, and allocate resources.
Emergency Public Information			
Warn of Hazards and Countermeasures	D&C uses local media, organizations internal channels.	D&C uses local media, organizations internal channels.	D&C and organizations use internal channels and mass media.
Operating Instructions	D&C uses local media, organizations internal channels.	D&C uses local media, organizations internal channels.	D&C and organizations use internal channels and mass media.
Status Reports	D&C uses local media.	D&C uses local media.	D&C uses mass media.

support may be either committed (commit resources), which involves transferring operating control to other organizations; or it may be contingency support by operating units (contingent support unit), which involves the temporary dispatch of operating reserves to support specific requirements of other organizations and the return of the unit to normal control when the requirement is taken care of. The shorthand of the exhibit refers to operations normally conducted within the indicated jurisdiction. Thus, the notation under host area for security and logistics "law enforcement controls operations" means that the law enforcement agencies of the host area jurisdictions provide security and logistic support to the headquarters of host area organizations.

The basic requirements for host and risk area organizations are similar, in that their transitions for emergency evacuation operations involve the maintenance of capability to accomplish their production, distribution and service functions. A difference is that host areas prepare to receive and care for the relocated population, while risk areas prepare to evacuate people and to extend support from their relatively greater resources.

The roles of federal, state and areawide organizations are to establish emergency measures and procedures, and to support local area operations with available resources. For emergency public information, it appears necessary for federal and state officials to communicate directly with the public to establish the validity of the defined hazard and the necessity for the countermeasures.

Operations by the national guard, military and state police units are difficult to categorize because of different organizational arrangements, different resource capabilities, different response patterns to individual hazard conditions, and the possible preemption of the national guard by the federal government. As with economic controls, state and local governments must expect that the federal government will judge the specific conditions and make policy decisions in the light of those judgements. Because of the vast and pervasive consequences of the decisions, it would appear prudent for state and local decisionmakers to plan and operate with the expectation of the most unfortunate (to them) environment.

4.2 MOVEMENT OPERATIONS

Emergency evacuation movement operations -- traffic control, essential operations and reception and care -- are listed in Exhibit 4.2. The roles of host and risk area organizations are differentiated to achieve the objective of relocating the population. Traffic control operations are handled by law enforcement personnel supplemented by auxiliaries within their normal jurisdictions. Some support by fire and mobile medical unit is required. The risk area law enforcement controls egress, state highway patrol controls arterial movement, and host area law enforcement controls ingress. The primary burden for host areas is to accomplish reception and care, employing local personnel and whoever can be effectively recruited from the relocatee population.

Risk area operations during the movement phase -- other than traffic control - are sensitive to the nature of the hazard. All the operations listed in Exhibit 4.2 are variable in the degree to which they may be implemented. The final determination of essential versus non-essential operations depends on higher-level determination of the nature of the hazard and the need for continuing support during the maintenance phase. The deployment of risk area public safety forces will depend primarily on judgements by the elected officials and department heads. Critical decisions regarding headquarter relocation and support commitments will affect continuing operations capabilities. It will be vital for essential risk area organizations to keep track of key personnel and maintain control of resources.

The roles of federal, state and areawide organizations are principally to monitor the movement and to adjust operations to alleviate difficulties. These orgnizations are also required to provide and commit contingent support for local operations for functions such as movement control on arterial highways, security and logistic support for essential risk area organizations, and emergency medical needs. Except for contingent support by risk and areawide organizations, host areas must operate largely with their own resources supplemented with auxiliaries and recruits from the relocatee population.

EXHIBIT 4.2

MOVEMENT OPERATIONS FOR EMERGENCY EVACUATION

MOVEMENT OPERATIONS	HOST AREA	RISK AREA	FEDERAL, STATE & AREAWIDE
Traffic Control			
Risk Area Egress-Auto	R&C prepares to receive.	Law enforcement controls egress routes and loads.	D&C monitors, organizations allocate support resources.
Risk Area Egress-Bus and Train	R&C prepares to receive.	Law enforcement controls egress routes and loads, D&C assign pickup points.	D&C monitors, organizations allocate support resources.
Arterial Movement, Rest Stops, and Accident Clearance	Law enforcement and auxiliary control egress, law enforcement and mobile medical support.	Law enforcement and mobile medical support.	Law enforcement controls routes and loads.
Host Area Movement to Reception Centers	Law enforcement and auxiliary control routes and loads.	Law enforcement monitors and adjusts egress.	D&C monitors, law enforcement adjusts arterial loads.
Essential Operations			
Essential Headquarters Relocation	D&C provides logistical support.	D&C and organizations control move, organizations provide communications.	D&C and organizations control move, organizations provide communications.
Essential Operations Transition	D&C monitors.	D&C and organizations control operations and establish staging areas.	D&C and organizations monitor, organizations adjust plans and schedules.
Non-Essential Operations Shutdown	D&C monitors.	D&C and organizations control time-phasing.	D&C and organizations monitor, organizations adjust plans and schedules.
Security and Logistical Support	D&C monitors.	Law enforcement and fire control operations.	Law enforcement and fire allocate and commit resources.
Ingress Control Points	D&C monitors.	Law enforcement and fire control operations.	Law enforcement and fire allocate and commit resources.
Reception and Care			
Receive and Register	School, church, welfare, etc., host area personnel conduct operations.	D&C monitors and adjusts egress, organizations track essential personnel.	D&C monitors and adjusts plans, organizations track essential personnel.
House and Feed	School, church, welfare and organizations, host area and auxiliary personnel conduct operations.	D&C and organizations provide logistical support for essential personnel.	D&C and organizations provide logistical support for essential personnel.
Special Groups	Organizations and auxiliary conduct operations.	Organizations allocate and commit resources.	Organizations allocate and commit resources.
Medical Emergencies	Medical organizations control operations with mobile medical units.	Medical organizations maintain emergency operations, contingent support units.	Organizations allocate and commit resources.
Contingent Support	D&C monitor, call for risk area and areawide unit support.	D&C allocate, organizations contingent support units.	D&C allocate, organizations contingent support units.

4.3 MAINTENANCE OPERATIONS

Once the emergency relocation of the population approaches completion, it will be necessary to conduct essential operations to maintain and sustain the population, and to ensure meeting special requirements (i.e., defense production and shelter protection in the nuclear crisis case). These operations are listed in Exhibit 4.3. The maintenance period is characterized by the continuation of essential production and distribution activities in the risk areas, and population maintenance and care in the host areas. Federal, state and areawide organizations should monitor the developing situation, consider population reallocation, and establish emergency measures and procedures. Both risk area and areawide organizations will maintain contingent support units to handle special problems in the risk and host areas, and to provide emergency services should the disaster strike.

During both the movement and maintenance phases of emergency evacuation, the deployment of support units will pose difficult problems for decisionmakers. The traditional role of emergency forces is to respond quickly to emerging disasters to mitigate their effects. Normally, this involves complete commitment of resources to immediate problems. For emergency evacuations involving long maintenance phase operations and evolving stresses on population and industry, the commitment of reserves may be dysfunctional.

Decisionmakers will be dealing with organizations and personnel operating in unfamiliar roles, and communications will be sparce, garbled, and conflicting. Normal intelligence sources will be eliminated or obscured. Thus, a major burden will be imposed on the operating units of areawide organizations both to support and monitor local conditions, and to communicate the situation to decisionmaking authorities. In cases of local operating breakdowns, they may be required to control operations. Other operations unique to the disaster conditions will evolve, requiring support by areawide organizations. Fallout shelter protection from nuclear radiation, as well as radiological monitoring and decontamination, is a function not normally provided by local governments and organizations. In many areas, deficiencies can be expected, and all jurisdictions will have incentives to enhance their protection. Resources for upgrading or constructing fallout shelters and conducting radiological defense are scarce and unevenly distributed by jurisdictions. Thus, it appears that it may fall to areawide organizations to assume responsibility for these activities.

EXHIBIT 4.3

MAINTENANCE OPERATIONS FOR EMERGENCY EVACUATION

MAINTENANCE OPERATIONS	HOST AREA	RISK AREA	FEDERAL, STATE & AREAWIDE
Law Enforcement			
Property and Personal Security	Law enforcement auxiliary control operations.	Law enforcement control surveillance and operations.	Law enforcement contingent support units.
Essential Industry Protection	Law enforcement and auxiliary control operations. Risk area and areawide contingent support units.	Law enforcement and auxiliary control operations, committed support for relocated headquarters.	Law enforcement contingent support units, committed support for relocated headquarters.
Criminal Activity	Law enforcement control operations, risk area and areawide contingent support units.	Law enforcement and auxiliary control operations contingent support units to host area.	Law enforcement contingent support units.
Traffic Control	Law enforcement and auxiliary control operations. Active and passive measures.	Law enforcement and auxiliary control operations, man control points.	Law enforcement contingent support units.
Detention Facilities	Law enforcement and auxiliary control operations. Risk area commits resources.	Law enforcement and auxiliary control operations. Commit resources to host area.	Law enforcement control operations.
Curfew & Special Procedures	Law enforcement and auxiliary control operations.	Law enforcement and auxiliary control operations. Contingent support units to host area.	Law enforcement contingent support units.
Fire Control			
Prevention	Fire and auxiliary control surveillance, education and operations. Risk area recruits.	Fire and auxiliary control surveillance and operations.	Fire monitors, contingent support units.
Suppression	Fire and auxiliary control operations. Risk area and areawide contingent support units.	Fire and auxiliary control operations. Contingent support units to host area.	Fire contingent support units.
Rescue	Fire monitors.	Fire and auxiliary control operations. Contingent support units from areawide.	Fire contingent support units.
Medical Care			
Chronically Ill & Aged	Medical and auxiliary operations, with risk area relocated support.	Medical and auxiliary control operations at essential facilities.	Medical commit essential facilities and operations.
"Normal" Population	Medical and auxiliary control operations, with risk area relocated support.	Medical control operations at staging areas. Contingent support units to host area.	Medical contingent support units.
Congregate Care Facilities	Medical direct medical auxiliary and risk area recruits.	Medical contingent unit support.	Medical contingent support units.

(EXHIBIT 4.3 - Continued)

MAINTENANCE OPERATIONS	HOST AREA	RISK AREA	FEDERAL, STATE & AREAWIDE
Transportation Equipment			
Local	Organizations control operations.	Organizations control operations.	D&C and organizations monitor and allocate.
Long-haul	Organizations monitor.	Organizations monitor.	Organizations allocate and control system operations.
Specialized Equipment	Organizations control operation.	Organizations control operations.	D&C and organizations monitor and allocate.
Construction and General-Use Supplies			
Construction	D&C and organizations allocate and control operations.	Organizations control operations.	D&C allocate and organizations control overall operations.
General-Use	D&C and organizations allocate and control operations.	Organizations control operations.	D&C allocate and organizations control overall operations.
Trucks and Special Equipment	Organizations control operations.	Organizations control operations.	Organizations allocate and control operations.
Defense-Related Production	Organizations control operations.	Organizations control operations.	Military and D&C allocate. Organizations control operations.
Shelter Protection			
Existing	D&C allocate spaces, and prepare operation plans.	D&C allocate spaces, and prepare operation plans.	D&C monitor and prepare population redistribution plans.
Upgradable	D&C and organizations determine requirements, areawide, risk area and host area organizations control operations.	D&C and organizations control operations.	D&C and organizations allocate resources, organizations control operations.
Expedient	D&C and organizations determine requirements, areawide, risk area and host area organizations control operations.	D&C and organizations control operations.	D&C and organizations allocate resources, organizations control operations.
RADEF	D&C and organizations allocate resources, areawide and risk area contingent support units.	D&C and organizations control operations, designate contingent support units.	D&C and organizations allocate resources, organizations control operations.

(EXHIBIT 4.3 - Continued)

MAINTENANCE OPERATIONS	HOST AREA	RISK AREA	FEDERAL, STATE & AREAWIDE
Public Health Operations			
Potable Water	Organizations control operations. Risk area and areawide commit resources.	Organizations control operations. Allocate and commit resources to host area.	Organizations monitor, allocate and commit resources.
Sewer Treatment	Organizations control operations. Risk area and areawide commit resources.	Organizations control operations, allocate and commit resources to host area.	Organizations monitor, allocate and commit resources.
Garbage and Trash Collection	Organizations control operations. Risk area commit support units.	Organizations control operations, allocate and commit units to host area.	Organizations monitor and allocate contingent unit resources.
Vector Control	Organizations control operations. Areawide and risk area contingent unit support.	Organizations control operations, allocate contingent units to host area.	Organizations monitor and allocate contingent units to host area.
Food Supplies			
Requirements and Use Rates	D&C and organizations estimate demands.	D&C and organizations estimate demands.	D&C and organizations determine supplies and allocation.
Supply and Distribution	Organizations and recruits control operations.	Organizations control operations.	D&C and organizations monitor and reallocate.
Conservation	D&C and organizations enforce procedures, areawide and risk area contingent unit support.	D&C and organizations enforce procedures.	D&C and organizations monitor and determine procedures.
Electric Power Supplies			
Supplies	D&C and organizations estimate demand.	D&C and organizations estimate demand.	Organizations allocate and control operations.
Conservation	D&C and organizations enforce procedures.	D&C and organizations enforce procedures.	D&C and organizations monitor and determine procedures.
Fuel Supplies			
Petroleum	Organizations estimate demand and control local operations.	Organizations estimate demand and control local operations.	Organizations allocate and control system operations.
Natural Gas	Organizations estimate demand and control local operations.	Organizations estimate demand and control local operations.	Organizations allocate and control system operations.
LPG	Organizatons estimate demand and control local operations.	Organizations estimate demand and control local operations.	Organizations allocate and control system operations.
Coal	Organizations estimate demand and control local operations.	Organizations estimate demand and control local operations.	Organizations estimate control system operations.
Conservation	D&C and organizations enforce procedures.	D&C and organizations enforce procedures.	D&C and organizations monitor and determine procedures.

5. COMPARISON OF EMERGENCY MANAGEMENT CAPABILITIES WITH REQUIREMENTS

5.1 EMERGENCY MANAGEMENT CONCEPTS

Civil defense guidance for nuclear war crisis relocation is usually stated in terms of plans rather than operations. The impact of the guidance on emergency requirements were explored and analyzed in Chapter 4. An earlier research study of host areas (Reference 5) also analyzed management requirements. That information is summarized here.

The guidance calls for essential organizations at state and local jurisdiction levels to make operational plans and to specify persons (or positions), resources and equipment to implement the plans. The feasibility, legality and logic of emergency evacuation is well developed and rationalized in the planning guidance and supporting documentation. As implemented in initial planning efforts, local operations plans reflect local environments, capabilities and preferences. In general, they also tend to perpetuate the historical emergency management philosophies of maintaining operational control by existing local organizations with traditional relationships. When needs exceed capabilities, host areas first call on adjacent risk area resources. State and federal government agencies provide support and determinate allocation of essential resources. The degree of change in operations depends on the severity of the threat, with centralized controls increasing as the country moves from normal times to crisis to hazard impact.

During large-scale emergency evacuation, it is planned that states will assume authority and responsibility for decisions regarding allocations of essential resources and for designating organizations to implement their decisions. States are also responsible for coordinating activities between jurisdictions, and providing emergency support. Relationships between state, local government, and private operating organizations tend to be tenuous in normal times -- often more characterized by competition than coordination. Large areawide and major city organizations are managed by specialists in the acquisition, production, allocation and distribution of their resources. Both state agencies and areawide organizations are usually headquartered in risk areas. Many host area activities, except local political

control, are directed by risk area organizations. Under evacuation conditions, their staff will be dispersed -- communication and coordination will be difficult, both to determine and control essential activities. Thus, the allocation, coordination and support tasks are certain to strain the capacities of most state agencies and of central state control.

Exercise of state authority and responsibility under emergency evacuation also will be difficult because of the many largely autonomous risk and host area city and county and private organizations. These organizations are the primary operating units both in normal times and under relocation conditions. To the extent that goods and services are produced and distributed, and people are sheltered and fed, the work will be supervised and accomplished at the local level. Most production, processing, warehousing, and distribution activities are centralized in risk areas, along with the sophisticated services necessary for efficient operation and control. Specialized resources and services exist in risk areas to serve the concentrated urban population. The capacity of the state to acquire reliable intelligence to make effective decisions, and to direct operations, will be strained by the large number of subordinate units. This problem will be especially difficult in densely populated areas similar to the Northeast Corridor. Guidance is sparce concerning control, coordination and operations of the many specialized disaster organizations.

Emergency management concepts indicate that operations will continue to be controlled by existing organizations. However, for the nuclear war or accident case fallout shelter protection from nuclear radiation, as well as radiological monitoring and countermeasures, are functions not normally provided by local government or private organizations. Deficiencies may be expected and all jurisdictions will have incentives to enhance their protection. Resources for upgrading and constructing fallout shelter and conducting radiological defense are scarce. Thus, it appears that it would be desirable for areawide organizations to assume responsibility for these activities.

There is an initial tendency to view the urban risk area as a cohesive jurisdictional unit that will be relocated to multiple host areas. Risk area resources will be dispersed and merged into host area operations to support the relocated population. Most often, risk areas include complex overlapping jurisdictions and organizations, representing equally complex overlapping constituencies. Under relocation conditions, the host sites for the constituency of any particular risk area jurisdiction will often be difficult to identify, let alone to serve. This difficulty will be aggravated by various relocation plans for employees of

various essential organizations. Thus, the proposition is weak that risk area managements should disperse their personnel, equipment and resources to serve their constituents in host areas.

Host area government and private organizations typically are tied more closely to their jurisdictions, employees and customers than risk organizations. Sparser population densities result in less specialization and more personal contact among the various officials. This represents a major asset for emergency evacuation, because the engendered characteristics promote flexibility, rapid response, and self-sufficiency needed to deal with the sudden influx of relocatees. As recognized by civil defense planning guidance, it is neither legally nor practically feasible to impose risk area (or state or federal) management on host area governments, businesses, and social activities.

The management system implicit in relocation planning guidance is in consonance with the historical evolution of emergency management systems that relate the degree of response of emergency operations to the anticipated extent and impact of the hazard. The greater the hazard, the greater the central control. There are, however, unique considerations for emergency evacuation operations:

- The president and state governors would initiate wartime crisis relocation only in extremely grave circumstances, in light of the cost, disruptions and losses involved with evacuations. The duration of the crisis and the potential losses will be uncertain throughout the course of the emergency. The relocation stance should be organized so that it can be continued indefinitely.

- There is a logical hierarchy of decision control, which relates the scope of the decision to the level of management (References 18 and 19). Host areas represent the operating (lowest) echelon of the relocation management structure; hence, host area management will depend on higher-echelon organization for decisions and support. Although the normal structure of essential business and government functions is continued and extended into the relocation period, many policy decisions will have to be made or reevaluated at all levels of control. This requires an effective feedback from local operations to higher-level decisionmakers, so they can efficiently mobilize and allocate resources and coordinate functions. Rapid, efficient and authoritative promulgation of higher-level decisions will be vital to local operations. Decisionmaking requires information clearinghouses (EOC's) which both centralize intelligence to support informed decisions and authenticate the promulgation of decisions.

- The number of demands and amount of information passed up from operating to control levels will increase during a crisis, as will the decisions and control passed down. Peacetime communication channels will be lengthened, intelligence systems disrupted, and existing clearinghouses eliminated. Public information sources will be independent of local control and coordination. News reports will be subject to various interpretations. System reliability and confidence will decrease, and personnel will be faced with unfamiliar decisions.

- Large-scale emergency evacuation will involve reorganization of existing management structures. The ultimate effect will be to decentralize operating management into host areas, and to centralize decisionmaking management to the state level (or state/regional level). This change will shorten the chain of command and broaden the span of control. More knowledge and capacity and clearer lines of authority and coordination will be required to maintain efficient operations.

- Large numbers of organizations and jurisdictions, both public and private, are involved in emergency evacuation management. Normally, many of these are largely self-sufficient, loosely coordinated, and interact on a minimal basis in a competitive (marketplace) mode. The political/economic systems are oriented to local and functional needs, and are relatively flexible and responsive to external change.

- It appears that it will be most efficient to maintain existing organizational systems, except where compelling arguments of equity and national survival prevail. The planned emergency organization should adequately recognize the separate functions of cities, towns and special districts (e.g., school, water and agriculture) that may be independent of and functionally dominate county government. Public and private risk area organizations tend to be more numerous, specialized, and complex, and to embody higher decision functions than those of host areas. Many, if not most, essential private organizations are subject to line control by management outside the host counties they serve; these conditions can lead to conflicts of authority.

- The dispersal of organizations (separation of personnel from operating communications, records and resources) during an evacuation will severely disrupt normal management systems. Production and consumption will be decentralized on a geographical basis. This will tend to reduce total production of goods and services, and will reorient distribution and coordination systems.

Marketplaces will cease to function; state agencies will reallocate resources. The many claimants will compete more actively for resources, because of uncertainties, dislocations and shortages.

- A major burden will be placed on federal and state government to control and allocate resources, particularly if their organizations are relocated or dispersed. Intelligence, communications and control systems may be inadequate to allow authorities to adjudicate equitably among claimants. Guidance is sparse concerning responsibility and control of interstate operations, particularly for the many specialized disaster organizations.

- The concept of dispersing risk area emergency operating forces to act as "fillers" for host area forces weakens potentially critical resources. In many cases, urban units are organized on a very sophisticated basis, with specialized training, equipment, intelligence and communication resources adapted to the urban population characteristics. Maximum flexibility and effectiveness can be achieved by keeping these forces under risk area direction, and organizing them into "task units" to respond to contingencies as they arise.

- There are significant disparities between geographical areas in hosting ratios, protection factors, resource availability, and productive capabilities. Within relocation areas, management policies should be structured to efficiently achieve maximum production and distribution. Areawide management policies under state and federal control should be structured to equitably allocate resources between relocation areas. Thus, all emergency management should be tailored to the needs of individual areas.

- Many local officials express open hostility to crisis relocation concepts. A typical host area position is based on desires to retain all peacetime political and economic prerogatives; this position may be shared by others as well. Arguments that the host area should retain peacetime prerogatives rest on a number of observations, including the:

  1. Political impossibility of planning to modify the existing structure of local authority and responsibilities;

  2. Opposition to any risk area authority in host areas;

  3. Expectation of extensive support from state or federal government to enforce police powers and provide resources;

4. Expectation that risk area personnel and resources will be available on call; and

5. Expressed opposition to relocation by organization, which would keep some risk area management lines intact and impose special logistic and control considerations.

- Many local officials doubt their ability to effectively manage operations and accept responsibilities under crisis relocation conditions. Host area personnel reinforce and emphasize the difficulties of dealing with relocatees. Current plans do not consider the incorporation of relocatees into host area activities, except possibly those relocatees belonging to churches or fraternal organizations and those with special skills. Local officials anticipate the following major problems:

  1. Intractable conflicts with special relocatee groups;

  2. Failure of relocatees to obey orders ("they should act as guests");

  3. Absence or inadequacy of fallout shelters, and the infeasibility of upgrading existing shelters or constructing expedient shelters; and

  4. Inadequate communication and RADEF capabilities.

5.2 COMPARISON OF PRESENT ORGANIZATION CAPABILITIES WITH REQUIREMENTS

In Chapter 4 (Exhibits 4.1, 4.2, and 4.3), organization requirements were spelled out for a maximum response (Class VII) emergency evacuation management system. In this section, these requirements are compared to existing disaster organization capabilities.

Present emergency organizations and management systems have evolved to meet the hazards of recurring disasters -- those in Classes I through V of Exhibit 2.1. As the nation's society and economy have grown more complex and more interdependent, emergency response systems have also grown. The systems, based on graduated response to hazard impact level, have served well. The nation has not been subject to nuclear disasters (Classes VI and VII) nor to the cumulative effect of simultaneous lesser disasters.

Research and extrapolation of experiences with natural disasters indicate that the United States has sufficient resources, services, and technical knowledge to cope with the hazards of Class VI and VII disasters. The task of this research is to highlight potential management system deficiencies, recognizing that exceptional capabilities may exist in some areas of the country. The analysis is perforce qualitative because the subject of emergency evacuation management effectiveness is qualitative. A further consideration is that nuclear (and other hazardous material) disaster response is a topical, emotional and political issue with wide ramifications -- the federal government and FEMA are focal points of the issue. The report of the President's Commission on the Three Mile Island Accident stated: "We are disturbed both by the highly uneven quality of emergency plans and by the problems created by multiple jurisdictions in the case of a radiation emergency...We found an almost total lack of detailed plans in the local communities around Three Mile Island. It is one of the many ironies of this event that the most relevant planning by local authorities took place during the accident...The response to the emergency was dominated by an atmosphere of almost total confusion" (as quoted in Reference 20).

For the basic operations outlined in Exhibit 4.1, host and risk area organizations are largely in response positions to directions from higher-level organizations. There is a sharp disparity in attitudes of local officials between disasters of local "moderate" impact and those of larger impacts. A survey of public officials' attitudes about disaster preparedness in California (for earthquakes) revealed that local managers "use moderate magnitude earthquakes as the basis for emergency planning. They do not feel that planning for a large magnitude event is worthwhile..." (Reference 21) because it is improbable and there is little they can do about it. The study recommends the "State develop and implement a comprehensive emergency management program..." A study of simulation training exercises presented nuclear war and earthquake crisis buildup scenarios to local officials (Reference 22). They were confident of their positions until the crisis exceeded local capabilities, then "there was the expectation that federal or state government would assert positive leadership, motivate the public, and issue emergency directives." In other words, local officials assume responsibility for emergency operations within their jurisdictions, and subject to control by their emergency operating forces. They do not feel responsible for decisions to deal with areawide or more severe disasters, particularly if the type of disaster is outside their experience.

Should federal or state direction be lacking or tardy, the tendency of local organizations is to commit personnel

and resources to immediate local operations, reducing their later availability and effectiveness. The ability of federal, state and areawide organizations to maintain continuity of operational control during a nationwide evacuation has not been demonstrated. The usual practice for Class I through V disasters of shifting control to sites outside the evacuation area may not be feasible. Normal intelligence systems will be disrupted, aggravating the increased load on decisionmakers. Communication deficiencies have been cited at all government levels, as have the lack of secure alternative headquarters. The emotional and political content of nuclear hazards, as well as inherent uncertainties, will require sensitive handling of emergency public information in a controversial environment. The ability of federal and state organizations to cope has not been demonstrated.

Most movement operations for evacuation (Exhibit 4.2) are under the direction and control of the established emergency service forces: law enforcement, fire and medical. Assuming that basic operational requirements (Exhibit 4.1) can be accomplished, it is reasonable to assume that the emergency services will be able to accomplish the difficult movement requirements. Past operations under emergency conditions provide experience and established coordination channels. Dynes and Quarentelli point out that "police, fire departments, hospitals, etc., since they traditionally operate on a 24-hour basis, have from two to three times the number of personnel necessary." (Reference 8)

Host area reception and care is a difficult problem to evaluate for regional and nationwide relocation. As described in Section 2.2, during natural disasters organizations like the Red Cross and specialized state and federal agencies are able to concentrate experienced and skilled management personnel in critical locations. These personnel are too few to impact large area operations. The flexible and resilient character of host area officials, along with the requirement of only general management skills for reception and care, allows limited confidence that most host areas will make do by a self-help, on-the-job learning process.

The dependence on volunteers is suspect. There are numerous groups of volunteers who regularly support emergency operations. These include personnel of the American Red Cross, the Salavation Army, and specialized communication, fire, police, and rescue organizations. For this report, these are referred to as "auxilaries" to differentiate from untrained, unorganized volunteers. Experience has shown that volunteer assistance is available during crises and disasters on a "feast or famine" basis. For many functions of emergency evacuation, particularly for local officials

without plans or experience, the difficulties of effectively integrating and controlling volunteer personnel may outweigh their potential usefulness. This is particularly true for the emergency services. Although "most emergency organizations will be the recipients of offers of assistance by local volunteers...the quantity and quality of volunteer help is very problematical...Even when they appear in large numbers, volunteers can be more trouble than they are worth." (Reference 8)

During the movement phase, the transition to essential operations and shutdown of non-essential operations will face risk area officials with unfamiliar problems and difficult decisions. The ability of areawide, particularly state, organizations to monitor developments and adjust plans and schedules during the movement phase is limited. Perhaps the state emergency services, with their established procedures and communications, can gather and disseminate emergency intelligence and decisions. The imposition of emergency resource allocation procedures and "freeze" orders (Section 2.2), originally designed to support in place protection, may impede evacuation operations. Dynes and Quarentelli are reassuring: "Disasters do not create total social chaos. Thus, there is no need for the imposition of strong controls or dictatorial direction" (Reference 8). What is required is local coordination of groups dealing with emergency operations, and this normally is accomplished by local people.

The list of requirements for maintenance operations (Exhibit 4.3) is long and complex. For prolonged evacuation conditions, a local host area official vividly stated the general problems: "It's like a visit by a mother-in-law, anyone can put up with it for the first week -- then conflicts arise, people take sides, and the condition becomes intolerable." (unpublished notes, Reference 5) For emergency service support -- law enforcement, fire control, medical care, and public health operations -- the management system pattern involves host and risk area control of local operations with contingent and committed support from adjacent and areawide organizations.

Areawide emergency service organizations are required to establish and maintain monitoring systems, to coordinate local services on an areawide basis, and to allocate personnel and equipment under their control. While these are difficult requirements, as for the movement phase, local and areawide emergency service organizations are disciplined to coordinate activities, they have established operating procedures and communication, and their responsibilities and prerogatives tend to be closely defined by law and tradition. The potential support by national guard and military units constitutes a major asset. It is noted that anticipated

needs for emergency forces during disasters is frequently overstated. "While symbolic security measures have to be taken, massive deployment of security forces is unnecessary...Contrary to a widespread belief there has never been in the history of the U.S. the necessity to declare martial law in a disaster area." (Reference 8)

Essential resource supply support during the maintenance phase includes food, electric power, fuel, transportation and construction and general use supplies and equipment. For the most part, these supplies are produced or processed, warehoused and distributed from risk area locations. They are under the direction and control of private organizations with headquarters in risk areas. Emergency management requirements (as outlined in Exhibit 4.3 and specified in crisis relocation planning) involve states assuming responsibility for determining demand levels by geographical area and per capita consumption rate and controlling overall allocations. Private organizations, designated by the states, would implement policy decisions and would control local operations. Under nationwide evacuation conditions (precluding the use of alternative headquarters in other risk areas), this concept of operations involves more centralized policymaking and more decentralized operations than normal (peacetime) operations. Management theory (Reference 18) requires more efficient communication, better intelligence systems, and more effective decisionmaking by central authorities; and more capacity and competence by operating personnel, for this type of management system to be effective. There is no basis from experience or research that these requisites can be met.

In addition to conducting essential operations, risk areas are also expected to provide resources, equipment and skilled personnel for extraordinary host area requirements. A typical attitude of host area officials is that they will present a "shopping list" of needs for risk area officials to deliver. It is difficult to visualize risk area officials voluntarily commandeering the private property of their constituents to fill an outsider's request, even assuming knowledge of location and physical capability to deliver the items. A basic requirement will be that higher-level authority validates host area claims, certifies the legitimacy of the seizure, and accounts for the transaction.

Fortunately, for short or intermediate level disasters, the resources and resiliencies of the economy and social structure are sufficient to preclude the need for an efficient management system. Even for severe, indeterminate emergency operations, many regions of the country may be able to operate effectively because of abundant resources relative to sparse population. Dynes and Quarentelli (Reference 8) point out that outsiders' judgements in almost all cases

underestimate community resources and overestimate demands. For example, emergency per capita planning requirements for food items are typically equal to or greater than normal consumption of these items. Thus, even for nationwide evacuation of risk areas, it may be that time will be available for areawide organizations to develop efficient management systems for essential commodities.

Shelter protection and countermeasures against radioactive fallout is a unique characteristic of nuclear material hazards. The large base of resources and organizational competence for other emergency service and resource supply problems is not normally available. These unique requirements will tend to devolve to state and federal governments, which have sparse capabilities.

In summary, comparison of present organization capabilities with disaster requirements yields the following observations:

- For disasters limited in geographical extent and degree of impact, local emergency organizations (both public and private) may be expected to perform adequately with limited outside support.

- As the magnitude of the disaster increases, local emergency organizations will continue to effectively operate systems internal to their jurisdiction, including reception and care of evacuees. However, local officials are dependent on higher authorities for critical allocation, coordination, and support resources. Local personnel are resourceful, competent and cooperative, but they cannot be expected to assume responsibilities normally exercised by areawide organizations.

- Emergency evacuation tends to negate effective top-level and middle management headquarter operations located in risk areas. State organizations are designated to assume policymaking and allocation roles. There is little confidence that these agencies have capacity to manage effectively.

- Fortunately, the resources and management personnel of local areas, and the nation as a whole, are sufficient to compensate for inefficient middle- and top-level management systems during disasters that have been experienced to date.

- There is a remote, difficult to define, possibility that nuclear war or nuclear material accident conditions, or a simultaneous cumulation of lesser disasters could require nationwide large-scale emergency evacuation of

risk areas. It is possible that the present organizational structure, based on the concept of graduated response, could be overwhelmed by a breakdown of middle- and top-level decision capacity. Then chaos would prevail.

6. RECENT MAJOR DISASTER EXPERIENCES

6.1 DISASTER EVENTS

In the fifteen months from late March 1979 to May 1980, three major events involved actual or potential emergency evacuation of large populations. The events were topical, subject of wide press coverage and public interest, and instructive to this study of emergency management organization.

Early in the morning of March 28, 1979 a site emergency was declared at the Three Mile Island (TMI) nuclear power plant near Harrisburg, Pennsylvania. Plans to evacuate over 600,000 persons living within twenty miles of TMI were developed during the emergency period, while technicians and scientists worked to assess and mitigate the potential hazards (Reference 23). Except for the precautionary advice to close-in pregnant women and pre-school children to evacuate, the hasty plans were not implemented.

Just before midnight November 10, 1979 a Canadian Pacific (CPR) railway train derailed in Mississauga, Province of Ontario, Canada. A total of 24 cars piled up at the wreck site and fire broke out immediately (Reference 24). These cars contained propane, chlorine and other toxic materials, resulting in both explosions and release of toxic gases. Within two hours, the first evacuation of 8,000 of an eventual total of 223,000 residents began. The evacuation lasted for a week, and was judged successful.

The cataclysmic eruption of Mt. St. Helens in southwest Washington State on May 18, 1980 tore off more than a thousand feet of the crest, flattened about 150 square miles of timber, and sent hot mud, ash and gases down the mountain. Winds carried thick clouds of volcanic ash over a three-state area (Reference 25). The eruptions continued over a four month period (Reference 26). Prior to the May 18 eruption there was a two month period of significant earthquake and ash and steam eruption activities (Reference 27) which led to limited access to the mountain area above timberline and to a state of emergency declared by the Governor. Emergency evacuation was considered among other hazard countermeasures during the buildup period. Except for the area in the immediate vicinity of the volcano (sparsely populated)

evacuation was not implemented, although many residents considered it a viable protection measure.

The three events represent a wide spectrum of hazard potential and realization, and of emergency response. The following paragraphs explore several findings for emergency evacuation management and operations.

6.2 DIRECTION AND CONTROL

Higher-levels of government are quickly involved in major disasters. In all three areas, the typical disaster response hierarchy of local jurisdiction, county (Peel Region in Canada), state (province) and federal government is the nominal authority sequence. In fact, for a variety of reasons, responses in each area were complex with strong participation by areawide and federal organizations. (One important reason is treated separately in a following section: major disasters involve technical knowledge not available at local level.)

The Director of FDAA Region III was assigned to the TMI emergency by the President "with all of the authority which would have vested normally in a Federal Coordinating Officer (FCO) in a declared disaster situation" (Reference 28). His task was to coordinate all emergency-support agencies; the staff included personnel from FDAA, DCPA, FPA, GSA, DOD, and the American Red Cross. A counterpart federal activity, headed by the Nuclear Regulatory Agency (NRC), was responsible for technical coordination and environmental monitoring at TMI.

The Governor of Pennsylvania, the Pennsylvania Emergency Management Agency (PEMA) and the Pennsylvania Bureau of Radiation Protection (BRP) also assumed decisionmaking and coordinating roles. Both PEMA and DCPA personnel were assigned to risk and host area county planning staffs to provide technical assistance. It is estimated that over 150 federal, state and local agencies were involved in the TMI emergency (Reference 23).

The situation at Mississauga proceeded more rapidly than at TMI. The CPR dispatch office was notified by the train radio system, and the CPR emergency plan was implemented immediately. Technical crews and experts were notified and instructed to report to the accident site. These included the Canadian Environmental Protection Services, Transportation Emergency Assistance Plan representatives, and the Canadian representative of the Bureau of Explosives of the Association of American Railroads. The Provincial Minister responsible for coordinating emergency measures was

alerted, and later requested the Canadian Forces for troops to support the police. Local hospitals, police and fire departments were already alert because the explosion had been observed by a fire dispatcher. Ontario Provincial Police were also involved on site. A little over two hours after the accident the Police Chief -- on advice of the experts -- started the evacuation which proceeded on a stage-by-stage basis (Reference 29).

At Mt. St. Helens, the U.S. Forest Service (USFS) quickly assumed command of the emergency response effort. The USFS had responsibility because of their jurisdiction over the forest lands around the volcano, their personnel were threatened, and they had an emergency response capability based on their fire control operations. At the same time, "most state and local agencies and officials were poorly prepared to respond to the eruption... The State of Washington's Department of Emergency Services, despite their formal responsibilities, did not play a key role in the initial emergency response period. Their chief function was to disseminate information to other state agencies" (Reference 30).

Shortly after the eruption the Federal Government set up a Disaster Field Office in Vancouver, Washington and designated an FCO (the Director of FEMA Region IX). As well as coordinating federal operations for the disaster, this office included a Joint Information Center and a Technical Information Network. The Joint Information Center brought together specialists from 10 agencies and was the prime source of information about the mountain and about disaster assistance. The Technical Information Network brought together medical, scientific and technical experts who collected and disseminated public information about hazard effects and countermeasures. In addition to the Field Office, there was a Search and Rescue Coordination Center and an Emergency Coordination Center. These were multi-agency and jurisdiction groups to coordinate emergency operations in the area around the mountain (References 26 and 31).

6.3 ROLE OF TECHNICAL AGENCIES

In stress of an emergency, technical agencies are accorded a significant role. In each of the three cited disaster events, technical knowledge was required to provide better definition of the hazard. Regardless of the legal responsibility for disaster response, the ranking agencies in a position to define the threat were influential, often beyond their expertise in emergency management.

At TMI the NRC, not the state agency, assumed the ranking technical role, and scientific assessments rather than preparedness concepts essentially determined the scope of the emergency management planning (Reference 23). At Mt. St. Helens, the expertise of the U.S.G.S. (and other university) scientists was vital for translating the siesmic and other precursor data for disaster response. While the evacuation at Mississauga was directed by local and regional officials, various expert agencies included at least four groups involved with chemical emergency mitigation, the meteorological and atmospheric environment services, as well as Dow Chemical Corporation computers "programmed to correlate data on weather, wind changes, types of buildings, population densities, and other factors to assist evacuation planning and decisionmaking" (Reference 29).

6.4 SPONTANEOUS EVACUATION

Public response, particularly the nature of spontaneous evacuation, is a significant uncertainty for emergency operations. Nuclear crisis relocation planning is predicated on the assumption that the total risk area population will move to host areas under the direction of government officials. Once in the host areas, all of these people will be cared for by the host government. This assumption is justified as a "worst case" condition, so any lesser requirement is a bonus.

The Mississauga evacuation is instructive. First, the cited 223,000 evacuees apparently (there are no available records) moved in large numbers to the large urban centers of Toronto and Hamilton. Instead of crisis hosting ratios of 2 to 4 evacuees to one resident, the Mississauga ratio was one evacuee to six to eight residents. The procedures were that reception centers were designated, evacuees were registered and then left on their own to leave or to stay at the center. "At no time were there more than about 3,000 people in all evacuation centers" (Reference 24). "No more than 1,500 people stayed overnight in the reception centers" (Reference 29). Available sources estimate the total number registered at between 30 and 40 thousand (Reference 29).

The Mt. St. Helens volcano did not involve evacuation except for the sparsely populated mountain area. During the precursor period from March to May, the problem was to keep people out of the area. When the eruption occurred, it became a search and rescue operation. It is instructive, however, that residents of towns around the volcano were quite cognizant of the potential need to evacuate. Preliminary data indicate that almost half of the people interviewed (over a month before the eruption) had made their

own arrangements to move to a safe destination. This was a significantly larger proportion than those who felt that evacuation might be a likely countermeasure.

The planning at TMI for the risk area counties generally followed the crisis relocation doctrine of providing for all evacuees. (Local planning was complicated by the changing risk area definitions of 5, 10 and 20 mile radius zones from the power plant.) However, all "four of the major risk counties attempted to estimate the number of spontaneous evacuees and all but Dauphin County made some adjustments to their estimates of their mass care needs. But only York County attempted to use this phenomenom as a major alternative to the location of mass care space" (Reference 23). The American Red Cross estimated that "140,000 people evacuated the area voluntarily; surveys showed the better educated and more affluent were the most likely to leave. These fears and resultant spontaneous evacuation cut sharply into the availability of volunteer resources in the communities close to the plant site" (Reference 20).

6.5 GENERAL EVACUATION PLANS

An all-hazards emergency management capability should include preparations for major population evacuations, but most local jurisdictions find it difficult to plan or maintain emergency operations capabilities, except by their emergency operations services. The FEMA crisis relocation planning is responsive to a particular hazard, with unique response conditions and requirements. Crisis relocation planning also could be used to enhance local capabilities for all-hazards emergency management. At a minimum, the following measures would be beneficial.

- Provide data on institutions and special groups requiring assistance, and on resources available to serve these groups (transportation, accommodations and personnel).
- Make provisions for augmenting small emergency management staffs at time of emergency, including notification procedures, check-lists and instructions for key personnel.
- Provide adequate, expandable and mobile (or alternative) facilities for emergency planning and operating personnel.
- Provide planned, redundant communications between local emergency organizations, and with decisionmaking organizations with special hazard expertise.

- Prepare procedures and materials to warn and instruct the public.

Full-scale, all-hazard plans, while obviously an attractive ideal, are seldom achieved: they are expensive, require constant updating and must be adjusted to the particular event. They generally reflect routine organization operations and relationships, and are too abstract and ponderous for rapid response to immediate threats. At Mississauga local sources credited the success of evacuation operation partially to "professional pre-planning, tested in a number of recent emergencies, including an air crash and a refinery tank farm fire" (Reference 29). However, a FEMA official noted that "Contrary to many newspaper and other reports we did not discern the existence of significantly meaningful emergency plans which could be the basis for the successful operations" (Reference 32).

Both the TMI and Mt. St. Helens event responses were without applicable evacuation plans. During the pre-eruption period at Mt. St. Helens, issues concerned control of the airspace and the relatively few loggers, residents and tourists on the mountainside. Efforts were sporatic. After the eruption primary efforts were devoted to search and rescue and mitigating the damage from the ashfall. Popular and political discussions were often centered on recriminations and financial responsibilities (Refererces 33 and 34).

There had been limited evacuation planning at TMI based on a five mile radius evacuation zone, which meant that most evacuees could be cared for in their resident counties. Expansion of the risk area to a 10 or 20 mile radius not only vastly increased the number of evacuees, but also required the involvement of numerous host counties. As a result, the original plans were of little value to officials responding to the emergency. In developing the revised plans, the data and expertise of state and DCPA officials, gained from the CRP experience, was invaluable to local planners.

6.6 PLANS FOR INSTITUTIONS AND SPECIAL GROUPS

During the Mississauga evacuation heavy emphasis and extensive operations by local officials were devoted to moving special groups of people. (It was noted in section 6.4 that most of the general population took care of themselves.) These special groups included over 2,000 hospital and nursing home patients. The operation involved evacuating three large active-treatment hospitals and six

nursing homes. "This had been achieved with resources of federal, provincial and municipal agencies, the facilities of approximately 25 hospitals and nursing homes, and ambulance and public transit services from 25 communities outside the evacuation area" (Reference 29). Operations were completed within 20 hours without a mishap.

The hasty planning for the TMI event by the risk counties was confused by the changing definitions of the evacuation area. All four of the major risk counties established medical planning as a separate function (Reference 23). The planning teams drew heavily on the services of physicians and public health administrators. Resultant plans were comprehensive and detailed for the identification, movement, special requirements and host destinations of hospital and nursing home patients. A major problem involved attempts to plan for non-institutional persons; the physically disabled, the home-bound elderly, etc. Data regarding this population was difficult to obtain. Plans for evacuation of at least one correctional institution (the Dauphin County Prison with about 200 inmates) were made with little difficulty.

Available sources for the Mt. St. Helens event did not report on plans nor operations involving special population groups. In summary, it is apparent that the special groups present a problem for emergency evacuation, as differentiated from the abilities of the general population to care for itself. The identification and care for the home-bound groups is particularly difficult.

6.7 OTHER CONSIDERATIONS

The accounts of the three disaster events touched on many other considerations relevant to emergency evacuation. The following paragraphs briefly describe these considerations.

Communications problems were cited for each emergency. It was reported that the Washington State Department of Emergency Services did not have a "communications system to warn eastern Washington communities that clouds of ash were about to fall on them" (Reference 33). At TMI, DCPA provided a radio communications system to link the state EOC with the risk counties, the Pennsylvania National Guard network, and with DCPA Region 2 in Olney, Maryland. It served primarily as a back-up system for other forms of communication. At Mississauga, emergency communications were augmented by the amateur radio operators emergency network. Twelve stations were established including a net control station. These were manned on a 24-hour basis with 175 operators. A COMSONT net,

involving 60 stations, passed emergency messages between municipalities (Reference 29).

Each disaster event included reports of the difficulties of coordinating the large number of jurisdictions involved. At TMI over 150 federal, state and local agencies were involved. Many of these were operating in stressful and unaccustomed roles. This may have led to the conclusion by the President's Commission: "The response to the emergency was dominated by an atmosphere of almost total confusion. There was lack of communication at all levels. Many key recommendations were made by individuals who were not in possession of accurate information, and those who managed the accident were slow to realize the significance and implication of events that had taken place" (as quoted in Reference 20).

Financial problems were a source of concern in the Mt. St. Helens event. In requesting disaster aid from the federal government, the Governor stated that "state and local governments cannot assume 25 percent of that cost impact (a projected $2.5 billion now) without totally decimating the state's economy and governmental services for years to come." The FEMA regional director is reported to have replied "we are talking about a percentage of nothing. All those (disaster relief) funds are broke. There is no money until Congress does something" (Reference 33). As late as August, 1980 the Governor stated that Washington had yet to receive any emergency funds. The Governor of Idaho and Montana also reported they had been unable to obtain funds (Reference 34).

7. FIELD TESTS

7.1 BACKGROUND

Emergency evacuation requirements and concepts were field tested in three jurisdictions during July and August 1980. Draft copies of the Guide were provided before the exercises to allow the participants to analyze the concepts and presentation. Thirty local and state officials participated in the exercises.

The Emergency Services Planners of Arizona were selected for the first workshop exercise because of their knowledge of and dedication to crisis relocation planning, their relatively outspoken approach to critiques, and their earlier contributions to the research. They were also interested in the application of the Guide to the new "Mini-CRP" program of FEMA. The workshop ran a full day, with comments directed at both FEMA's policies and requirements, and at the content and format of the Guide.

The second workshop exercise for the Emergency Evacuation Guide, and the first exposure to local government officials, was in Sonoma County, California. The county was selected because of its active, motivated and well-informed director, its key location as a potential host and transit area for San Francisco evacuees, and its overall competent government structure. The workshop ran a half-day. Comments were directed to the format and content of the Guide.

The City of Jackson and Hinds County, Mississippi, Emergency Operating Center staff and emergency services personnel were the focus of the third workshop. The city is a designated risk area for nuclear crisis relocation, has had recent evacuation experience as a result of floods, and has served as a host area for refugees from Gulf hurricanes. Jackson has not yet been the subject of nuclear civil preparedness planning. The Mississippi State Emergency Management Agency personnel who attended the meeting are responsible for statewide emergency evacuation planning. Prior to the workshop, we had extensive background discussions with the Jackson-Hinds director and the FEMA regional representative. The workshop ran a half-day. There were comments on the applicability of the Guide, and on the status of State and City planning.

7.2 FORMAT

The three field tests were conducted with similar formats. Participants were encouraged to develop their criticisms, so the emphasis varied between workshops. The background and objectives of the study were reviewed briefly. In each case, there was a general discussion of the Guide, with participants citing their strong feelings about evacuation conditions and the content of the Guide. This discussion was channeled to four major areas:

1. Purpose and Use
   - Content
   - Practicality
   - Compatibility
   - Consistency
2. Functional Review
   - Management and Operations
   - Natural Disasters
   - Nuclear Considerations
3. Technical Review
   - Radiological Defense
   - Shelter Operations
   - EOC Operations
   - Reception and Care
   - Communications and Warning
   - Emergency Information
4. Relationships
   - Risk/Host Area
   - City/County/State (Region)
   - City/County/Federal

The elements under Technical Review were selected because they were considered both critical to successful evacuation and hosting, and because they would be of primary concern to the participants. The field tests were continued by solicitations of specific comments on the wording and format of the Guide. Pertinent comments have been included in the final version. The exercises were concluded with remarks about the most significant elements of emergency evacuation management, as seen by the participants.

Selected comments of the participants have been incorporated into the Guide and other sections of this report. Other comments are reported in the following paragraphs. (Functional Review and Relationships are combined because of overlapping responses.)

7.3 PURPOSE AND USE

There was general agreement that the sections of the Guide conform to local and state organization and legal conditions. The Guide contains no offensive or esoteric language and the terminology was readily understood by the participants. (As noted, there were specific points which were corrected in the final version.)

There was a major, extensive discussion of financial considerations during each workshop, pointing out that the guidance is inadequate. (This had been anticipated by the FEMA and research personnel, but specific guidance is unavailble.) Sonoma County participants' comments were typical. They would like specific guidance on where to go for what support. Timing is critical. The County has limited sources of funds which they would use first, then they would turn to the state. The outcome of this is uncertain, and legislation (both State and Federal) is needed. The problems of financing hospital care were cited. The experiences with reinforcing levees in the Delta were also cited, claiming that most work was done and paid for locally. They are more confident of financial support by Federal and State sources for very major disasters (earthquake or war) than for more limited events.

There were wide ranges of opinions expressed on planning for emergency evacuations. Generally the local officials considered that they had limited responsibility for relocatees, and for planning for evacuation. Department heads are not interested in general planning or operations. Their job is to direct specific resources to specific problems. The evacuation event might be too sudden to use the Guide. Plans "go out the window" with the first onslaught of the disaster, with local forces merely

responsive to events. When things settle down, plans for remedial actions are made in light of events.

There was discussion of the "host-area-first" approach to planning. On one hand the risk area considerations come first because they are the source of the evacuation refugees and support resources; on the other hand host area potential capabilities determine the destination of refugees. Thus, concurrent planning is desirable. It appears that the Guide gives minimum adequate information for risk area emergency planners. For example, the traffic engineering personnel are not told how to designate vehicles to highways, but they are confident they could route people out, provided critical roads are available.

There were many comments that the Guide tells them what to do, not how to do it. Operating personnel (i.e., fire and police officers) want detailed checklists. The Arizona state planners considered that detailed checklists were not feasible in general guidance. Management and planning personnel recognize the role of the Guide as a general document, and that local officials should develop specific checklists because only they have the necessary data and experience.

7.4 FUNCTIONAL REVIEW AND RELATIONSHIPS

There was quick recognition of the difficulty of the Guide in addressing all levels of disasters, both risk and host areas, and all sections of the county. "Mississippi is a rural state, not like New York or California." The breadth of the Guide in covering all levels of disasters causes difficulties, because the problems are considered very different. "The nuclear crisis relocation problem is significantly different from other emergency evacuation problems because of the lack of availability of host spaces." The nuclear CR problem involves resource management problems not critical to local disasters. The requirement for fallout shelters involves resources to stock shelters as well as for current consumption. The standards for operations will vary by disaster conditions.

Most participants felt that the only way to absorb evacuees would be in individual homes because most congregate care facilities are clearly inadequate. This would also disperse people, avoiding the crowding problems (health, protection, sanitation, feeding, etc.) of congregate care facilities. There was extended discussion of past disaster experience showing that most evacuees do reside with friends and relatives.

Resources will be a major problem. Logistics will be difficult. Sonoma does not have adequate transportation or storage facilities. Rather they depend on central city (Oakland and San Francisco) facilities. These will be necessary during an evacuation to divert resources into the county.

Mississippi does not have a State Resource management plan. In Jackson, they consider that they have a good "handle" on government resources, but not on private resources. They don't know what is available nor how to obtain them. They have little faith in requisitioning. The Guide emphasizes the need for "close relationships" between host and risk area governments so that host areas may obtain needed resources. These relationships do not exist. They doubt that risk areas will have surpluses to give to host areas. Fire department personnel, for example, indicated an increased burden with evacuation (detection problems). Fire personnel would remain in the risk areas because "it is part of their job."

Federal guidance imposes arbitrary rules without regard for local capabilities and realities. "Planners should make assumptions only for their own level of control." The role of federal agencies is undefined. The financial (fiscal) policies are not stated. Support systems are inadequately covered, but vital. The risk versus host area problems demonstrate a need for "Comprehensive Emergency Management." Local governments need a framework within which to make management decisions and to develop a rudimentary capability. This varies by level of disasters.

There was general expression that local government's role was to prepare for local natural disaster, not large scale events. For Sonoma planners the concept of establishing working relationships with San Francisco is considered impractical. They have enough problems with adjacent jurisdictions and areas. There would have to be areawide, "dictatorial", control by State or Federal government for resource allocation. The present state regions are for support only, not for operational control which is left to local jurisdictions. The view was expressed that State and Federal coordinating officers would be appointed. (The Mt. St. Helens volcano appointment of Bob Stevens was cited.) The interaction with fiscal considerations was explored with the conclusion that local jurisdictions would not be reimbursed if they took initiatives. "The more bosses the less is done. There needs to be a single decision point." The Mississippi session ended with the summary that "the most important weakness of evacuation planning and operations is that no one is in charge."

7.5 TECHNICAL REVIEW

In Sonoma the sheriff and fire chiefs used to have RADEF trained personnel, but not now. The State Highway Patrol has trained personnel and instruments (at weighing stations), but these are limited to "a truck turning over somewhere." The dispatcher has a checklist on what to do. The Public Health Department has responsibility for radiation problems.

There was general agreement that local RADEF capabilities have declined over the past decade and are inadequate. It is considered that the public really doesn't understand the hazard. For example, in Mississippi a rural police chief never could understand why he wasn't provided "protective clothing" for his personnel. Also in Mississippi they have the planning problem for the Grand Gulf nuclear power plant.

There is inadequate data on fallout shelter location and condition. Mississippi officials consider CSP planning inadequate and obsolete. (Several participants questioned the designation of Jackson as a nuclear target site.) Information on the construction of hasty shelters (and shelter upgrading) is inadequate. (The discussion went on to the pros and cons of including classic DCPA schematic guidance, without clear resolution.)

Arizona officials consider the shelter problem includes engineering, management and resource allocation. There will be competition between the immediate needs for resources and shelter stocks. A major obstacle to CRP planning is the survey data. This could be alleviated by limiting the amount of data required and simplifying the reporting procedures. The "span of control" will be too great if you ask managers to handle both congregate care and shelter facilities.

The Jackson hurricane reception experience is that the vast majority of refugees take care of themselves. They have personal preplanned destinations and government efforts to channel them to government planned destinations is dysfunctional. (The Mississippi CRP hosting ratio is one to one.) Real problems for evacuation are the population groups -- rest home patients cited -- who need special care and handling. This requires detailed, difficult to obtain, data. For example, they do not know the number of aged and infirm in private homes. Another problem for Mississippi is that most hospital spaces and related major medical facilities are in the City of Jackson. All other cities are small and depend on Jackson for care. These classes of problems appear more important and difficult than general reception and care.

Sonoma officials share the view that reception and care problems are less critical for general individuals than for special needs such as hospitals, prisoners, and the aged.

Blood banks were cited as an example, which in Sonoma is a Red Cross responsibility.

Several officials viewed the reception center registration forms as unweildy for handling refugees. One approach would be to use only one card, issued in the risk area, which would give only human needs information. It would be submitted on arrival in the host area and would suffice to allow allocation to congregate care facilities. Another approach to the initial registration, possibly in the evacuee's car, would be to only get names, number of persons, and special skills, and then assign the occupants to a congregate care facility or shelter. Once settled, they could get other information, issue ration cards, etc. The Guide's organization (charts) are too complex. "We'll be lucky to get 4 or 5 people for registration." Problems of assessing evacuees skills were discussed. There are problems of achieving capability of registrars to make assignments. How do they get data? This is more important than the tallys.

Warning and emergency communications are adequately covered in the Guide. Each locality represented in the field tests has good facilities. There are over 90 NAWAS drops in Mississippi, so they consider themselves overloaded. However, statewide emergency communications are weak, with only two statewide systems. There was a general belief that operations would breakdown in rural host areas. Sonoma and Arizona officials feel they have adequate statewide communications.

The Guide reiterates DCPA materials on Emergency Public Information. This is proper and useful. However, the real problem is specific local instructions, not general materials. "You must tell individuals where to go and what to do in specific terms." It was agreed that this is a local government problem.

8. ALTERNATIVE MANAGEMENT SYSTEMS FOR EMERGENCY EVACUATION

8.1 MIDDLE MANAGEMENT CENTER CONCEPT

The analyses of emergency evacuation requirements and emergency management capabilities reveal significant potential deficiencies. Many of these deficiencies result from the lack of overall capabilities to assess hazard conditions and to coordinate responses of the many essential jurisdictions and organizations. Contacts with local government officials, NCP planners, and FEMA regional representatives revealed both the lack of and need for coordination between host area, risk area, and regional public and private sector management personnel. The nature of the problems are further confirmed by the many research studies and disaster experiences cited throughout this report, as well as the field tests for this and prior studies.

Numerous approaches to specific elements of the emergency management issue are also cited in this report. The State of California is presently considering a proposal to establish "two permanent earthquake-proof command centers. It would be at these centers that the governor, the president's emergency representative and local political leaders would assemble to agree on life-and-death policy decisions in this or any other major disaster" (Reference 35). This proposal includes a computer based emergency management information system and emphasis on private industry participation. Other proposals include very large statewide data banks and centralized management decision systems. Section 8.3 discusses the difficulties of implementing emergency management systems in the real world. The successful application of the FIRESCOPE program in the Los Angeles area is controlled by professional (fire service) agencies, and is based on a specific, recurring, well-defined and recognized threat. The Dow Chemical Company programs (an outgrowth of the TMI event) referred to in Chapter 6 are under private control, and are responsive to toxic material hazards. The authors of this report are skeptical of the feasibility of effectively implementing large-scale, politically-controlled data banks and management systems. Witness DCPA's (now FEMA's) difficulties with the CSP and NFSS systems.

These considerations led to the concept of a middle management center (MMC) to coordinate the activities of each evacuation area. The MMC would function as a clearinghouse for intelligence and as a decisionmaking body for the allocation of relocation area personnel and resources. Though the center would act primarily as a "command post," it might also assume operating responsibility for tasks outside the usual scope of local government. The center would serve as a focal point for contacts with state and federal government agencies. The following paragraphs discuss, more specifically, the ability of the proposed middle management centers to lessen the organizational weaknesses imposed by emergency evacuation.

The nation would be divided into several hundred relocation areas (including both risk and host counties) based on existing risk/host conglomerates and economic/trading area definitions. Many existing state and regional organizations are based on similar geographic, economic, or political areas. Most of the relocation areas would include crisis relocation risk areas. An MMC would be formed for each relocation area. There is a precedent for such an organization in metropolitan area authorities and in regional private and government entities (although none have the breadth of responsibility envisioned for the MMC).

The MMC would be delegated authority to act for federal and state governments, and to coordinate private organizations in all matters internal to the emergency evacuation. It would be responsible for preparing and disseminating public information, for upgrading and constructing fallout shelters, and for coordinating RADEF operations. If the relocation area were wholly within one state, a state official might be in charge; if the area overlapped state boundaries, a federal official might be in charge.

The MMC staff would include representatives from local jurisdictions and all essential federal, state and industrial organizations. (Many small organizations would be represented by a dominant company or an association representative.) The representatives would coordinate intelligence and operations for jurisdictions on a functional basis. Unless prohibited by disaster effects, operations would be managed from the usual headquarter sites. The higher-level decision structure would continue, with coordination by federal, regional and state EOC's.

The MMC should be sited to ensure physical protection and communication capacity. Ideally, it would be located at the population and transportation centroid of the relocation area, outside the risk area. (A separate study [Reference 9] concerns the availability and capability of EOC's, and

investigates the feasibility of State Highway Department sites.)

Risk and host area operating units and organizational structures would be maintained (not dispersed as "fillers" for host organizations), except for those (e.g., schools) whose clientele were completely dispersed. Host area organizations would manage increased demand by expanding operations with auxiliary personnel from the host area and relocatee population. This would be accomplished on a self-help, best-effort, training-on-the-job basis. Specialized risk area operating units would be maintained intact, to meet risk area needs or to be dispatched (at host area request and MMC direction) to offer contingent support.

The field tests confirmed the general validity of the MMC concept. However, the following factors should be considered:

1. Each area needs to be considered separately, and the nationwide system may involve different local configurations.

2. The MMC concept is consistent with FEMA EOC and communications (Reference 36) planning, but these concepts may also need to be considered separately by area.

3. Significant questions remain about national conformity versus local and state laws, practices, and organizational structures.

During the field tests, some officials were reluctant to accept the concept that primary responsibility for RADEF and public fallout shelters should be shifted from local to RAOC control. Nevertheless, all discussions dealt in some way with the inability of host areas to supply these services and facilities. Relations between risk and host areas should be confronted and studied in order to better understand the degrees to which:

1. Activities and authorities of state and federal government and the private sector should be integrated;

2. Host areas can operate (or plan) independently; and

3. Planning should focus on anticipated post-hazard requirements.

It was clear that more thought and effort should be devoted to the roles of target cities and their relationship with the host areas. Although this subject was discussed at length (not always directly) in all the exercises, no agreement was reached on the proper course to take, the role of a middle management center, or even the need for more precise plans. Officials recognize that the problem is vital, however, and that solutions will be difficult to find.

8.2 EMERGENCY HEADQUARTER (EOC) OPERATIONS

The earlier report, based on host area requirements, considered alternative management systems, and concluded that a viable concept for management during crisis relocation should include decentralization of policy-level management personnel to relocation areas, with the authority to make, promulgate and implement decisions, and with the capability to communicate both intelligence up from and policy decisions down to local governments. This section of the report relates that concept to the role for emergency management headquarters (EOC's).

The degree to which decisions should be shifted to higher organizational levels is directly related to the degree to which operating personnel are unaccustomed and unable to deal with problems. This applies to resource allocation, coordination, and support operations.

Examples (taken from Reference 17) are instructive to applying this concept. The temporary unavailability of several ambulances in a risk area might result from minor mechanical failures. Decisions about this type of problem are likely to be handled as an extension of similar problems encountered on a day-to-day basis. Working-level personnel at hospitals and ambulance companies would determine in a routine manner which patients have critical needs, and would allocate the ambulances still in service to those patients.

In contrast, the problem could be long-term, continuing shortage of ambulances because they were being used for emergency evacuation of hospital and rest home patients, or there had been a rash of evacuation-caused injuries. The decision to allocate the remaining ambulances would almost certainly involve hospital management personnel and representatives of risk area government, as well as the working-level personnel. Local authorities would attempt to obtain additional ambulances from other sources or to find substitutes. They might go to adjacent jurisdictions or to the state seeking additional ambulances; or, having attempted and failed, they might press station wagons and vans into service as substitutes. Should each hospital, each ambulance

company, and all levels of government become involved, the situation would become confused and much time and effort would be diverted from other essential activities. An intermediate authority knowledgeable of the ambulance resources and requirements for the whole relocation area could perform the function of allocating and designating use of ambulances at the area level. It could delegate that responsibility on a one-time or permanent basis to a specific lower-level organization, or it could seek resources from the state or federal government.

Coordination is required for emergency operations to function efficiently. In small-scale emergencies that often frequently face police, fire, and emergency medical services, decisions are sometimes made by agency dispatchers, sometimes by personnel at the scene, and most often by a combination of both. As the degree of the hazard increases or extends to a significant area of the city or county, political officials become involved along with the police chief, fire chief, or other heads of government departments. For very large-scale emergencies, such as hurricanes, federal and state officials become involved. Obviously, as more people are involved, effective coordination of various operational and decisionmaking functions becomes both more difficult and more critical.

Coordination involves the assignment of specific functions to specific persons and organizations. Because the assignments often involve scarce resources, coordination is closely related to resource allocation. Many emergency assignments are fixed by the nature of the personnel and organization. Fire suppression in a local jurisdiction is always the primary responsibility of that fire department. Specific assignments normally are handled on a routine basis by unit dispatchers. Decisions are based on fire reports, other requests for assistance, the commitment of equipment, and the nature of the situation.

Should unusual and dangerous conditions arise, as in emergency evacuation, the nature of the situation changes to a degree that normal dispatch intelligence must be supplemented by higher-level coordination. Many simultaneous fires could result from improper shutoff procedures, criminal activities, or absence of early observers. Not only must the citywide fire situation be monitored, it must also be coordinated with crime, traffic, accident, utility, and similar conditions. This situation requires centralized coordination of all the city's emergency operating forces.

Support operations include receiving, evaluating and responding to requests for additional support. These requests may be for additional units, for special equipment, or for supplies from the parent organization. The requests

may also be from similar organizations in other jurisdictions, or from different services. Much of the support function normally is performed routinely by agency dispatchers. However, as for the resource allocation and coordination functions, major crisis and disaster conditions will require centralized control.

There is a range of opinions concerning the best way to effect the coordination necessary for the decisionmaking involved in large-scale disasters. At one extreme is the position that all activities (including dispatching) should be brought together into a single facility. In part, this approach can be explained by years of planning for operations in a nuclear attack environment in which the EOC could provide protection against fallout and possibly against blast and other weapons effects. This attitude may partially stem from the desire of some civil preparedness personnel to aggrandize their authority in an emergency. At the other extreme, many officials intend to conduct all operations from separate agency headquarters outside of the EOC, except those specifically assigned by the highest authorities. This position may come from recognition that the efficiency and effectiveness of operations will diminish if they are directed without adequate intelligence and communications available only by resources and logistic support at organization headquarters. This position may also result from a lack of willingness of many agencies to subordinate their emergency operations to higher-level organizations, or from lack of experience with situations requiring protected operations.

Examination of these extremes, and various intermediate positions, has led to the conclusion that during emergency evacuation considerations of efficiency and effectiveness of operations should prevail. Operations should be directed and controlled from agency and organization headquarters. Coordination between organizations and with central government can be accomplished better by telecommunications and periodic meetings than by combination of top-level personnel in a single facility with crowded space, limited communications, and inadequate backup resources. In many host areas, government officials are normally in a single facility. In risk areas, top-level management and support personnel would be operating under the same conditions as other essential workers. Risk area headquarters of areawide organizations should also continue to operate. Existing EOC's would be used by the political executives, and could serve as a backup location for operating managers should in place protection be required.

To the extent required, flexibility and protection should be provided by pre-arranged alternate headquarters outside of risk areas. Ideally, these would also provide the

host area reception, care and shelter facilities for essential organizations.

It appears that during major emergency evacuation operations, essential risk area organizations will be saturated with internal operating and coordination problems. The need for effective areawide resource allocation, coordination and support is a proper federal, state and regional organization requirement at policymaking levels. These organizations should establish decentralized headquarters within each relocation area, outside of risk areas. A cadre of personnel should be assigned, bearing the credentials of authority of the parent organizations. Mobile headquarter units -- with capability to tie into communication networks -- would allow onsite control, rapid response, and flexible operations (as for the FIRESCOPE system).

8.3 IMPLEMENTATION OF MIDDLE MANAGEMENT SYSTEM

The alternative middle management system of Sections 8.1 and 8.2 involves the creation of operating centers to embody the decentralized authority and responsibility of federal, state and areawide emergency organizations. It is conceded that it would be difficult to implement such a management system under present conditions and attitudes. That view is reinforced by other findings, as the experiences in the Los Angeles County attempts at regional organization (Reference 37). This section addresses fundamental difficulties involved and suggests a course to overcome the difficulties.

The California earthquake survey concluded that it would only be possible to "give disaster preparedness a higher priority if such programs were mandated and more fully funded by state or federal governments. Increases in expenditures...do not appear to be acceptable to the current State Administration" (Reference 21). A study of New England municipal governments found: "There is a lack of urgency or priority about emergency planning among local officials and citizens...because of the infrequency of disasters compared to other day-to-day problems confronting municipal government officials, and because there is no obvious return to citizen tax investments for emergency planning" (Reference 38).

The lack of continuing concern at all government levels for disaster preparedness is a major impediment to developing a comprehensive emergency management system. It is often observed that officials become concerned only in the aftermath of major disaster. "Interest in disaster preparedness increases following a major disaster, proportional to the damage produced. However, this interest

passes quickly as residents and local leaders seek to return as soon as possible to normal conditions. Important lessons about mitigation and hazards reduction are lost during the rehabilitation period due to lack of programs to direct and channel this increased awareness" (Reference 21).

A second difficulty is that the concern is narrowly focused on response to the particular event. Thus, "there are a variety of specialized programs -- usually established in response to some notable event or crisis -- that address portions of the problem posed by natural hazards...Elements of a comprehensive program exist at the state and local level of government and in the private sector, but little attempt has been made to link them together in a coordinated manner..." (Reference 21).

The third difficulty stems from confusion about the roles of designated overall disaster preparedness organizations. In normal (non-disaster) times, local officials view the main activity of organizations -- FEMA and the state emergency agencies -- as "the administrative oversight of local governments' performance on federal programs that provide financial support and assistance to local government." Thus, "federal and state preparedness programs are viewed as being bureaucratic and largely unnecessary by local officials." "It would...help if the required paperwork (particularly the multiplicity of planning documents) was reduced so that greater effort could be applied to the local preparedness function" (Reference 21). Local officials object to complex and lengthy planning requirements; they desire simple and short guidance or checklists. It should be noted that this is a common complaint of operators against administrators, based on a lack of appreciation of the need for and difficulty of providing coordination and accountability.

More relevant is the observation by Dynes and Quarantelli that: "Patterns of leadership in disaster-impacted communities are very complex...almost all communities are not organized to cope with disasters. This is true even in localities with extensive pre-disaster planning, since there is a considerable difference in anticipating problems and facing them. What disasters do is to create a series of new problems for the community...(which) necessitate new relationships between its parts...Therefore, new social forms have to be created and new relationships forged." (Reference 8) Thus, the relevant problem relating to the "confusion" regarding the proper pre-disaster role for top-level emergency organizations is to communicate the need for standby capacity to coordinate and support local activities that will perforce change because of the impact of crisis or hazard effects.

In summary, the fundamental difficulties for implementing a comprehensive emergency management system include:

- Lack of concern at all levels of government because disasters are viewed as transient, temporary aberrations, with limited significance to ongoing operations.

- Disasters are considered local, particular events to be countered by individual, specific programs.

- The impact of crisis or disaster events requires an unpredictable readjustment of management relationships at all operating levels. Top-level pre-disaster activities are onerous administrative burdens to local day-to-day operations. Hence, disaster preparedness is considered irrelevant.

It should be noted that these difficulties are pervasive, not isolated to any particular emergency management system.

Should FEMA decide to implement a management system to cope with the deficiencies outlined in Section 5.2, it appears that a feasible course would be to develop cadre elements to be deployed as coordinating units for disasters of sufficient magnitude to require emergency evacuation. The cadre elements should embody the authority of federal and state governments, and should assume the major role of coordinating agency and areawide organization support to local areas. They should confine their activities to policy-level decisionmaking coordination and resource allocation. They should not attempt to direct local operations. In no sense should they be required to justify their existence on a cost/benefit basis. Rather, they should be an integral part of the general government overhead burden.

While disasters are infrequent at local levels, they often recur on a national basis. The systematic employment of cadre management units would provide a significant and continuing experience base for all elements. (Staff would be drawn from existing agencies.) Initial conflicts of authority with specialized ongoing operations would be brought to light, and could be ironed out. There would be a unified display of top-level federal and state support to local operations. This might impact legislators and voters sufficiently to engender higher levels of support for disaster preparedness. It might also alleviate the contingent criticisms (as the Three Mile Island case) of lack of federal capability to deal with crises. It appears that the only feasible way to implement such a program is for FEMA to assume leadership thro gh subordinate units considered

relevant and prestigous. Active support to initiate the system should be sponsored by groups such as the Fire Academy program for the hazardous materials.

9. SUMMARY OF RESEARCH FINDINGS AND RECOMMENDATIONS

9.1 SCOPE OF RESEARCH

The major objective of this research effort is to assist the Federal Emergency Management Agency (FEMA) in developing and evaluating emergency evacuation management requirements and concepts. A second objective was to develop a "Guide for Emergency Evacuation Management and Operations" directed primarily to local officials who might be faced with an evacuation condition without prior plans or experience. The Guide has been distributed separately.

FEMA planning guidance, emergency organization plans and operations, other research studies, and recent disaster events were analyzed to determine management requirements, procedures and limitations. Several tasks were involved:

- Present emergency management capabilities were investigated to determine the status of organizations, hazard conditions, and plans and operations.
- Emergency evacuation operations were analyzed at host area, risk area and state and federal levels.
- Management requirements were determined for the various jurisdiction levels during the basic, movement and maintenance phases of emergency evacuation.
- Emergency evacuation management requirements were compared to capabilities and deficiences were noted.
- Recent major disaster events involving actual or potential evacuations were analyzed to learn differences between doctrine and practice.
- Field tests were conducted with local government officials to explore and validate research findings, and to test the applicablity of the Guide.
- A middle management center concept for large-scale emergency evacuations was developed and related to requirements. The feasibility of implementing the concept was explored.

- Results of the analyses and field tests were evaluated and are incorporated in this final report.

9.2 PRESENT EMERGENCY ORGANIZATIONS

A legacy of traditional and legal practices underlies the present structure of emergency organizations in the United States. Local fire, law enforcement and health agencies are structured to deal with "moderate" disasters at the local jurisdictional levels. (The definition of "moderate" tends to be vague, typically indicating a level of disaster with which local forces can cope with minimal outside support.) Military bases have traditionally supported adjacent civil populations. National guard units, either under state or federal control, have been used for disaster mitigation, control, and relief, and to provide personal and property security. The prestige and financial resources of federal organizations are the bases for significant impact on the policies and procedures of local organizations.

The American Red Cross has a special congressional charter directing it "to carry on a system of national and international relief in times of peace and to apply the same in mitigating the suffering caused by pestilence, famine, fire, flood, and other great national calamities." Its disaster services staff is frequently dispatched to a disaster scene to provide administrative and supervisory personnel to assist local chapters. In large operations, national personnel often supplement local personnel. Other religious, welfare, and private organizations also provide significant relief and assistance. In many communities, churches and the Salvation Army have a quasi-official relationship with the police and fire departments, and as a matter of routine provide many types of help.

The emphasis of the federal civil defense program has been to assist state and local government -- financially, technically, and administratively -- to protect their residents from the dangers of nuclear war and radioactive fallout. Necessary components of a nationwide civil defense system have been developed, including warning and communication networks, radiological monitoring capabilities, and state and local EOC's. The present effectiveness of the components is varied and difficult to measure. During the early 1970's, the concept developed that a nuclear attack would very likely be preceded by a period of international tension or crisis, providing time for emergency evacuation. This concept led to an extensive crisis relocation planning program.

Many states have adopted legislation giving broad emergency powers to state government and setting up emergency response procedures for both war and peacetime disasters. All states and most communities have some form of emergency preparedness organization to direct or coordinate disaster activities. The state organizations are often associated with national guard units.

Superimposed on these traditional, general-purpose disaster organizations are federal and state agencies and commissions created to deal with specific disaster hazards. Several of the federal disaster oriented agencies have been incorporated into the FEMA organization. Organizations have also been created at state levels; for example, the California Seismic Safety Commission to deal with earthquake disasters. Present organizations have attributes and legal precedents that have been demonstrated over time to be feasible and effective. When any new or modified concept of operations or management system is conceived and analyzed, it faces the legacy of existing procedures and organizational prerogatives and must be justified in terms of necessity and benefits, as well as political and operating feasibility.

The present management system to mitigate the effects of disaster may be characterized briefly as follows:

- There is a triad of responsibility between federal, state and local governments.
- Local jurisdictions have basic responsibility for handling "moderate" disasters within their areas.
- Should the disaster extend beyond a local jurisdiction, or should it become of greater magnitude than the local people can handle, the state becomes involved by coordinating and providing resources. Should the disaster reach proportions that overwhelm local government, the state may assume operating responsibility.
- The federal government normally acts in a coordinative and supportive role. For disasters of catastrophic impact and very wide extent, the federal government may assume control, although this possibility is considered remote. Some system of shared responsibility is more likely.
- Many public and private organizations at all levels of operation have traditional and legal roles. These organizations direct and control local operations that do the actual work.

9.3 DISASTER HAZARDS AND WARNING

The overall FEMA program is directed toward assisting state and local governments to improve their readiness for life-saving operations and mitigation of damage resulting from natural and manmade disasters and nuclear attack. FEMA has two basic strategies for protecting populations threatened by major hazards. One is to provide the best protection possible with the population "in place" at or near their homes, schools and places of work if the warning time is short. The second is for people to leave the threatened area if time allows. The latter involves the orderly evacuation of people from high-risk areas (areas likely to be directly affected by hazards) to low-risk host areas (and their reception, care and protection in the host areas).

Some disasters are typically preceded by adequate warning time to allow evacuation (or other countermeasures) before the impact of the hazard. This assumes that the nature of the warning is sufficiently definitive to distinguish high-risk from low-risk geographical areas. Adequate detection, identification, and dissemination systems are required. These qualities do not necessarily accurately predict the severity or extent of the impact, duration, or secondary effects. (Typically, longer disaster warning times embody greater uncertainties.)

The duration of a disaster refers to not only the time of the hazard impact, but also the time for the effects to subside to a sufficient degree to begin recovery and restoration operations. Emergency mitigating operations may be conducted during the disaster impact period (e.g., levees may be reinforced during a flood).

Another significant characteristic distinguishing disasters is their frequency or recurrence, which allows emergency organizations to develop and gain experience with effects and countermeasures. Only with epidemics (in recent history), nuclear materials accidents, and nuclear war crisis relocation is experience unavailable at the national level. Terrorist actions involving nuclear weapons are a potential, imminent threat. However, by the nature of the subject, most local officials have limited experience with most types of disasters.

Present emergency organizations and management systems have evolved to meet the hazards of recurring disasters. As the nation's society and economy have grown more complex and more interdependent, emergency response systems have also grown. The systems, based on graduated response to hazard impact level, have served well. The nation has not been subject to nuclear disasters nor to the cumulative effect of simultaneous lesser disasters.

Research and extrapolation of experiences with natural disasters indicate that the United States has sufficient resources, capabilities, and technical knowledge to cope with the hazards of all disasters. The task of this research is to highlight potential management system deficiencies for emergency evacuation, recognizing that exceptional capabilities may exist in some areas of the country.

9.4 EMERGENCY EVACUATION MANAGEMENT CONCEPTS

Evacuation management systems relate the degree of response of emergency operations to the anticipated extent and impact of the hazard. The greater the hazard, the greater the central control. This is in consonance with the historical evolution of emergency organizations. There are, however, unique considerations for large-scale emergency evacuation operations:

- All states and many local jurisdictions have basic operational plans which specify essential persons (or positions), resources and equipment and operations. Local operations plans reflect local environments, capabilities and preferences. In general, they also tend to perpetuate the historical emergency management philosophies of maintaining operational control by existing local organizations with traditional relationships. When needs exceed capabilities, host areas first call on adjacent risk area resources. State and federal government agencies provide support and determine allocation of essential resources.

- The logical hierarchy of decision control relates the scope of the decision to the level of management. The degree of change in operations depends on the severity of the disaster, with centralized controls increasing as the hazard increases. Although the normal structure of essential business and government functions is continued and extended into the evacuation period, many policy decisions will have to be made or reevaluated at all levels of control. This requires an effective feedback from local operations to higher-level decisionmakers, so they can efficiently mobilize and allocate resources and coordinate functions. Rapid, efficient and authoritative promulgation of higher-level decisions will be vital to local operations.

- Large numbers of organizations and jurisdictions, both public and private, are involved in emergency evacuation management. In normal times, many of these are largely self-sufficient, loosely coordinated, and interact on a minimal basis. The political/economic systems are

oriented to local and functional needs, and are relatively flexible and responsive to external change.

- For disasters limited in geographical extent and degree of impact, local emergency organizations (both public and private) may be expected to perform adequately with limited outside support.

- As the magnitude of the disaster increases, local emergency organizations will continue to effectively operate systems internal to their jurisdiction, including reception and care of evacuees. However, local officials are dependent on higher authorities for critical allocation, coordination, and support resources. Local personnel are resourceful, competent and cooperative, but they cannot be expected to assume responsibilities normally exercised by areawide organizations.

- The dispersal of organizations (separation of personnel from operating communications, records and resources) during a prolonged emergency evacuation will severely disrupt normal management systems. Production and consumption will be decentralized on a geographical basis. This will tend to reduce total production of goods and services, and will reorient distribution and coordination systems. The many claimants will compete more actively for resources, because of uncertainties, dislocations and shortages.

- Emergency evacuation tends to negate effective top-level and middle management headquarter operations located in risk areas. State organizations are designated to assume policymaking and allocation roles. There is little confidence that these agencies have capacity to manage effectively.

- A major burden will be placed on federal and state government to control and allocate resources, particularly if their organizations are relocated or dispersed. Intelligence, communications and control systems may be inadequate to allow authorities to adjudicate equitably among claimants. Guidance is sparse concerning responsibility and control of interstate operations, particularly for the many specialized disaster organizations.

- Fortunately, the resources and management personnel of local areas, and the nation as a whole, are sufficient to compensate for inefficient middle- and top-level management systems during disasters that have been experienced to date.

- There is a remote, difficult to define, possibility that nuclear war or nuclear material accident conditions, or a simultaneous cumulation of lesser disasters could require nationwide large-scale emergency evacuation of risk areas. It is possible that the present organizational structure, based on the concept of graduated response, could be overwhelmed by a breakdown of middle- and top-level decision capacity. Then chaos would prevail.

9.5 ROLES OF LOCAL, STATE AND FEDERAL ORGANIZATIONS

Local officials of risk and host area jurisdictions consider (quite properly) they are adequately prepared to deal with "moderate" emergency hazards within their areas. This has led to the concept and procedure for planning and operations which implies a succession of responsibility and authority from local to state to federal agencies. Arguments that the local areas should retain normal prerogatives during emergency evacuation rest on a number of observations, including the:

- Political impossibility of planning to modify the existing structure of local authority and responsibilities;
- Opposition to any outside authority in host areas;
- Expectation of extensive support from state or federal government to enforce police powers and provide resources;
- Expectation that risk area personnel and resources will be available on call; and
- Expressed opposition to relocation by organization, which would keep some risk area management lines intact and impose special logistic and control considerations.

In normal (non-disaster) times, local officials view the main activity of designated overall disaster preparedness organizations -- FEMA and the state emergency agencies -- as administrative oversight of local governments' performance on programs that provide financial support and assistance. They feel that if the required paperwork (particularly the multiplicity of planning documents) was reduced, greater effort could be applied to the local preparedness functions. Thus, overall federal and state preparedness programs are viewed as being bureaucratic and largely unnecessary by many local officials.

There is a counterpoint attitude in many state and federal organizations that their proper role is limited to support and coordination. As long as local jurisdictions bear primary operating responsibilities, areawide organizations are reluctant to make commitments prior to the disaster event. The combination of local and higher-level attitudes tends to create a void for overall control of a large scale emergency evacuation.

Consideration of three recent major disaster events (Three Mile Island, Mississauga, and Mt. St. Helens) which involved actual or potential evacuations leads to significantly different conclusions. In each case, federal and state agencies were quickly and directly involved in local operations. In each case, the technical expertise and operating capabilities of areawide organizations were vital to local decisions and operations. In each case, officials at all levels found appropriate roles and means of support and coordination despite deficiencies in planning and preparedness. The effectiveness of the many organizations involved in these events was varied and is difficult to evaluate. In retrospect, there have been recriminations and cited short-comings. It appears that the response to these events could have been more effective if there had been a preplanned central emergency management structure.

9.6 FINANCIAL CONCERNS

Local officials repeatedly emphasized the need for federal or state anticipatory funding for equipment, supplies, and radiological protection before the evacuation. Financial support during emergency evacuation may be assumed, but the necessary procedures and authorities are often either unknown or misunderstood by local officials. They expect long lead times when ordering and installing materials and equipment. Emergency communications are generally cited as most critical and also inadequate. Local officials consider organization and implementation to depend on firm contracts, which require firm funding.

The entire subject of economic and monetary controls and procedures is fraught with uncertainties for local officials. Economic and fiscal procedures for accounting and paying for resources and supplies are expected to be defined by higher-level directives. It can be assumed that no one will be denied the essentials for lack of money, and that the expenses incurred by businesses, governments and other institutions preparing for and implementing evacuation will be financially redressed through a variety of federal actions. (While no policy has been enunciated, it is believed that in the real case any federal proclamation

requiring evacuation would also address such topics as fiscal liability/responsibility, public use of private assets, and use of government employees outside of their home jurisdiction.) However, it is unlikely that specific state and federal policies will be announced prior to evacuation, so local officials may be required to conduct initial operations according to their own judgements.

There were extensive discussions of financial considerations during the field tests, pointing out that guidance is inadequate. (This had been anticipated by the FEMA and research personnel, but specific guidance is unavailable.) Local officials would like specific guidance on where to go for what support. Timing is critical. Counties have limited sources of funds which they would use first, then they would turn to state and federal sources. They feel the outcome of this is uncertain, and legislation (both state and federal) is needed. They are more confident of financial support by federal and state sources for very major disasters (earthquake or war) than for more limited events.

Financial problems were also a source of concern in the Mt. St. Helens event. As late as August, 1980 the Governor stated that Washington had yet to receive any federal emergency funds. The Governors of Idaho and Montana also reported they had been unable to obtain funds.

9.7 EMERGENCY EVACUATION PLANS

Local organizations consider themselves largely in a response position to directions from higher-level organizations for large-scale emergency evacuations. There is a sharp disparity in attitudes of local officials between disasters of local "moderate" impact and those of greater impact. A survey of public officials' attitudes about disaster preparedness in California (for earthquakes) revealed that local managers use moderate magnitude earthquakes as the basis for emergency planning. They do not feel that planning for a large magnitude event is worthwhile because it is improbable and there is little they can do about it. A study of simulation training exercises presented nuclear war and earthquake crisis buildup scenarios to local officials. They were confident of their plans and capabilities until the crisis exceeded local capabilities, then there was the expectation that federal or state government would assert positive leadership, motivate the public, and issue emergency directives. In other words, local officials assume responsibility for emergency operations within their jurisdictions, and subject to control by their emergency operating forces. They do not feel

responsible for plans or decisions to deal with areawide or more severe disasters, particularly if the type of disaster is outside their experience.

During the field tests, there were wide ranges of opinions expressed on planning for emergency evacuations. Generally the local officials considered that they had limited responsibility for relocatees, and for planning for evacuation. Department heads are not interested in general planning or operations. Their job is to direct specific resources to specific problems. The evacuation event might be too sudden to use published guidance. Plans "go out the window" with the first onslaught of the disaster, with local forces merely responsive to events. When things settle down, plans for remedial actions are made in light of events.

An all-hazards emergency management capability should include preparations for major population evacuations. The FEMA crisis relocation planning is responsive to the nuclear war hazard, with unique response conditions and requirements. Most local jurisdictions find it difficult to plan or maintain emergency operations capabilities, except by their emergency operations services. Crisis relocation planning could be used to enhance local capabilities for all-hazards emergency management. At a minimum, the following measures would be beneficial.

- Provide data on institutions and special groups requiring assistance, and on resources available to serve these groups (transportation, accommodations and personnel).
- Make provisions for augmenting small emergency management staffs at time of emergency, including notification procedures, check lists and instructions for key personnel.
- Provide adequate, expandable and mobile (or alternative) sites for emergency planning and operating personnel.
- Provide planned, redundant communication between local emergency organizations, and with decisionmaking organizations with special hazard expertise.
- Prepare procedures and materials to warn and instruct the public.

Full-scale, all-hazard plans are obviously an attractive ideal. But they are seldom achieved: they are expensive, require constant updating and must be adjusted to the particular event. They generally reflect routine organization operations and relationships, and are too

abstract and ponderous for rapid response to immediate threats.

9.8 PUBLIC RESPONSE

Public response, particularly the nature of spontaneous evacuation, is a significant uncertainty for emergency operations. Nuclear crisis relocation planning is predicated on the assumption that the total risk area population will move to host areas under the direction of government officials. Once in the host areas, all of these people will be cared for by the host government. This assumption is justified as a "worst case" condition, so any lesser requirement is a bonus.

Although the intent of emergency evacuation is to depopulate the risk areas, a substantial number of people are likely to remain. These will include workers in essential industries and operations, those people who cannot be moved for medical or other reasons, and those who are unwilling to move. The total number of "stay-puts" cannot be determined in advance, because it will depend on the nature of local emergency operations and on individual perceptions of the feasibility or necessity of evacuation. Many local officials do not consider it practical to force individuals to evacuate.

Civil defense policy in nuclear crisis relocation is to house the relocatees in public congregate care facilities rather than in private residences. This approach ignores experience and research indicating that many of the relocatees would move to private homes of relatives or friends; it anticipates the most severe burden for host area reception and care. An initial function of host area officials should be to encourage and facilitate the placement of relocatees in private residences.

The Mississauga evacuation is instructive on public reception and care. The procedures were that reception centers were designated, evacuees were registered and then left on their own to leave or to stay at the center. Available sources estimate that of the total of 223,000 evacuees the number registered was between 30,000 and 40,000. At no time were there more than 3,000 people in all evacuation centers and no more than 1.500 people stayed overnight in the reception centers.

The American Red Cross estimated that at TMI 140,000 people evacuated the area voluntarily; surveys showed the better educated and more affluent were the most likely to leave. For the Mt. St. Helens event preliminary data

indicate that almost half of the people interviewed (over a month before the eruption) had made their own arrangements to move to a safe destination. This was a significantly larger proportion than those who felt that evacuation was a likely countermeasure. Local officials at Jackson, Mississippi are experienced in host area operations resulting from Gulf hurricanes. Their experience is that the vast majority of refugees take care of themselves and have personal preplanned routes and destinations. Government efforts to channel them to government planned destinations is dysfunctional.

Many local officials consider the major problems for evacuation are the population groups, like rest home patients, who need special care and handling. These operations require detailed, difficult to obtain, data. It is difficult to know the number of aged and infirm in private homes. These special population groups were major problems during the Mississauga and TMI disaster events. To many local officials these classes of problems appear more important and difficult than the movement and reception and care of the general population.

9.9 MIDDLE MANAGEMENT CENTER CONCEPT

Analyses of emergency requirements and capabilities reveal both the lack of and need for coordination between host area, risk area, and regional public and private sector management personnel. During the field test at Jackson, a local official summed the meeting "the most important weakness of evacuation planning and operations is that no one is in charge." A middle management center (MMC) could coordinate the activities of each evacuation/reception (E/R) area and function as a clearinghouse for intelligence and as a decisionmaking body for the allocation of E/R area personnel and resources. Though the center would act primarily as a "command post," it might also assume operating responsibility for tasks outside the usual scope of local government. The center would also serve as a focal point for contacts with state and federal government agencies.

The nation would be divided into several hundred areas based on existing risk/host conglomerates and economic/trading area definitions. Many existing state and regional organizations are based on similar geographic, economic, and political areas. A MMC would be formed for each E/R area. There is a precedent for such an organization in metropolitan area authorities and in regional private and government entities (although none have the breadth of responsibility envisioned for the MMC).

The MMC would be delegated authority to act for federal and state governments, and to coordinate private organizations in all matters internal to the E/R area. It would be responsible for preparing and disseminating public information, for upgrading and constructing protective shelters, and for coordinating RADEF operations. If the E/R area were wholly within one state, a state official might be in charge; if the area overlapped state boundaries, a federal official would be in charge. However, each official would have authority over functions within his purview.

The MMC staff would include representatives from local jurisdictions and essential federal, state and industrial organizations. The representatives would coordinate intelligence and operations for jurisdictions on a functional basis. Operations would be managed from the usual headquarter sites. The higher-level decision structure would continue, with coordination by federal, regional and state headquarters.

9.10 MIDDLE MANAGEMENT OPERATIONS AND FACILITIES

The MMC should be sited to ensure physical protection and communication capacity. Ideally, it would be located at the population and transportation centroid of the E/R area outside of probable hazard risk areas.

The MMC concept involves the decentralization of policy-level management authority and personnel to E/R areas, with the authority to make, promulgate and implement decisions, and with the capability to communicate both intelligence up and policy decisions down to local governments. The degree to which decisions are shifted to higher organizational levels is directly related to the degree to which operating personnel are unaccustomed and unable to deal with problems. This applies to resource allocation, coordination, and support operations.

When resources are short, local authorities attempt to obtain additional supplies from other sources or to find substitutes. They may go to adjacent jurisdictions or to the state seeking additional resources. Should each consumer, each supplier, and all levels of government become involved, the situation would become confused and much time and effort would be diverted from other essential activities. An intermediate authority knowledgeable of the resources and requirements for the whole E/R area could perform the function of allocating and designating use of scarce resources at the area level. It could delegate that responsibility on a one-time or permanent basis to a specific lower-level organization. It also could seek resources from the state or federal governement.

Coordination involves the assignment of specific functions to specific persons and organizations. Because the assignments often involve scarce resources, coordination is closely related to resource allocation. Coordination is required for emergency operations to function efficiently. In small-scale emergencies that frequently face police, fire, and emergency medical services, decisions are sometimes made by agency dispatchers, sometimes by personnel at the scene, and most often by a combination of both. As the degree of the hazard increases or extends to a significant area of the city or county, political officials become involved along with the police chief, fire chief, or other heads of government departments. A large-scale emergency evacuation would involve federal and state officials and effective coordination of various operations and decisionmaking functions would become both more difficult and more critical. This is a role for the MMC.

Support operations include receiving, evaluating and responding to requests for additional support. These requests may be for additional units, for special equipment, or for supplies from the parent organization. The requests may also be from similar organizations in other jurisdictions, or from different services. Much of the support function normally is performed routinely by agency dispatchers. However, as for the resource allocation and coordination functions, major crisis and disaster conditions will require centralized control.

There is a range of opinions concerning the best way to effect the decisionmaking involved in large-scale disasters. At one extreme is the position that all activities (including dispatching) should be brought together into a single facility. At the other extreme, many officials intend to conduct all operations from separate agency headquarters outside of the EOC, except those specifically assigned by the highest authorities. Examination of these extremes, and various intermediate positions, has led to the conclusion that during emergency evacuation considerations of efficiency and effectiveness of operations should prevail. Operations should be directed and controlled from agency and organization headquarters. Coordination between organization and with central government can be accomplished better by telecommunications and periodic meetings than by combination of top-level personnel in a single facility with crowded space, limited communications, and inadequate backup resources.

Essential local operating units and organizational structures should be maintained (not dispersed as "fillers" for host organizations), except for those (e.g., schools) whose clientele were completely dispersed. Host area organizations would manage increased demand by expanding

operations with auxiliary personnel from the host area and relocatee population. This would be accomplished on a self-help, best-effort, training-on-the-job basis. Specialized risk area operating units would be maintained intact, to meet risk area needs or to be dispatched (at host area request and MMC direction) to offer contingent support.

Effective areawide resource allocation, coordination and support is a proper federal, state and regional organization requirement at policymaking levels. These organizations should establish decentralized headquarters within each E/R area, outside of risk areas. A cadre of personnel should be assigned, bearing the credentials of authority of the parent organizations. Mobile headquarters units -- with capabilities to tie into communication networks -- would allow onsite control, rapid response and flexible operations.

9.11 IMPLEMENTATION OF A MIDDLE MANAGEMENT CENTER SYSTEM

The middle management center (MMC) system of Sections S.9 and S.10 involves the creation of E/R area operating centers to embody the decentralized authority and responsibility of federal, state and areawide emergency organizations. It is conceded that it would be difficult to implement such a management system under present conditions and attitudes. In summary, the fundamental difficulties for implementing a comprehensive emergency management system include:

- Lack of concern at all levels of government because disasters are viewed as transient, temporary aberrations, with limited significance to ongoing operations.

- Disasters are considered local, particular events to be countered by individual, specific programs.

- The impact of crisis or disaster events requires an unpredictable readjustment of management relationships at all operating levels. Top-level predisaster activities are onerous administrative burdens to local day-to-day operations. Hence, disaster preparedness is considered irrelevant.

It should be noted that these difficulties are pervasive, not isolated to any particular emergency management system.

Should FEMA decide to implement a management system to cope with the deficiencies, it appears that a feasible course would be to develop cadre elements to be deployed as coordinating units for disasters of sufficient magnitude to

require emergency evacuation. The cadre elements should embody the authority of federal and state governments, and should assume the major role of coordinating agency and areawide organization support to local areas. They should confine their activities to policy-level decisionmaking coordination, resource allocation and support functions. They should not attempt to direct local operations. In no sense should they be required to justify their existence on a cost/benefit basis. Rather, they should be an integral part of the general government overhead burden.

While disasters are infrequent at local levels, they often recur on a national basis. The systematic employment of cadre management units would provide a significant and continuing experience base for all elements. (Staff would be drawn from existing agencies.) Initial conflicts of authority with specialized ongoing operations would be brought to light, and could be ironed out. There would be a unified display of top-level federal and state support to local operations. This might impact legislators and voters sufficiently to engender higher levels of support for disaster preparedness. It might also alleviate the contingent criticisms (as the Three Mile Island case) of lack of federal capability to deal with crises. It appears that the only feasible way to implement such a program is for FEMA to assume leadership through subordinate units considered relevant and prestigous. Active support to initiate the system should be sponsored by groups such as the Fire Academy program for the hazardous materials.

Appendix A

FEDERAL, STATE, AND AREAWIDE OPERATIONS

A.1 CONCEPT OF OPERATIONS

This appendix deals with the operational requirements of federal, state and private regional organizations to support local activities. A primary characteristic of these organizations is that they embody top-level decisionmaking and control functions, distinguished from local organizations that embody operating functions and capabilities.

In the following discussion, primary reference is to state government merely to simplify concepts and terminology. It should be recognized that decisionmaking roles will vary between areas of the country, between traditional and legal relationships of interacting organizations, and because of perceived levels of stress and criticality. For example, bulk grain shipments are normally controlled by private commodity brokers who serve the producers, distributers and consumers. Private organizations operate in their traditional activities, influenced by profit motivation. Government control is exercised passively by state and federal regulatory agencies. In emergency situations, any of the many organizations might extend its individual authority, depending on the specific crisis requirements. Therefore, the primary purpose of this appendix is to distinquish emergency "top-level" functions from those "operating" functions subject to local control.

The mission of state government in emergency evacuation is to support the activities of local jurisdictions to provide for the needs and protection of the population. The state may conduct two kinds of crisis operations: First, state forces may be employed in direct support of local operations (i.e., units or individuals assigned from its own forces to augment local forces); second, the state can assure local availability of essential goods and services by controlling and expediting their production, distribution, and use within the limits of what is available. This requires coordination of the activities of public and private organizations, whose combined efforts are required to transfer available resources to those who need them.

An initial function of state government is to identify hazards, determine potential disaster effects, evaluate alternative countermeasures, select a course of action, and promulgate its decisions. For disasters that strike without warning, these actions are based on surveys of damage. For disasters that are typically preceded by warning, the state actions are based on detection systems and disaster indicators. When the state decides to implement protective measures--evacuation or in place protection--the countermeasure itself is likely to disrupt normal activities. The nuclear crisis relocation emergency is an extreme example of a countermeasure, designed in part to preclude the attack, which involves such extensive disruptions that it would constitute a disaster only less extreme than war itself. Thus, though limited responses may be decided at local levels, major responses to extensive disaster threats are a primary responsibility of top-level decisionmakers.

This appendix discusses direct operational, and resource and supply support. Specific consideration is then given to telecommunications, emergency public information, and economic measures.

A.2 DIRECT OPERATIONAL SUPPORT

State employees and organizations may be deployed during emergency evacuations to conduct state emergency operations (typically in state facilities), as well as to assist local governments. Operational support can only be supplied from those state (federal and private) organizations that have substantial operational capabilities: for example, the state police or highway patrol, or the state highway department. Support by the state highway patrol would first be needed to assist in traffic control during the evacuation movement, probably on state and federal highways. The need for this original commitment would diminish when the major evacuation movement was complete. At that time, the units might be committed to a second activity (for example, to control through traffic on the main resource distribution routes). Or units could be withdrawn to a reserve status for later contingencies. Support by state highway department units would be needed when the unusual traffic patterns resulting from the relocation caused damage to essential roadways. Similar considerations would apply to the assignment of other state organizations and employees. Direct support could also be provided by one locality to another, but to accomplish this effectively, some coordination will be needed to assign surplus capacity. This is a state function in an emergency evacuation situation.

A.3 RESOURCE AND SUPPLY SUPPORT

The relocation of population during an emergency evacuation would alter the geographical pattern of production and supply, and of the demands for goods and services. It would also alter the extent of demand, because the supply of goods and services would be restricted to those essentials for survival. For the most part, these essential goods and services would be supplied by companies that have developed organizational and operational arrangements -- both internal and intercompany -- that operate efficiently to meet the normal demand patterns. It is unlikely that an alternative or substitute arrangement could be constructed quickly that would operate as well. The changes imposed by emergency evacuation would require rapid adjustment of the production/distribution system. Officials of existing essential industries and services will require two types of information. First, they must know what essential goods are to be supplied. Second, they must know the extent of the redistribution of people and the nature of their demands. This information should come from the state, because only the state and its local jurisdictions have the resources and authority to develop the information. In addition, quantitites and recipients must be specified (i.e., who gets how much of what). This involves not only the allocation of end items for consumption, but also goods and services required for production and distribution. Again, this is a state activity because only the state has the authority to establish such allocation systems.

The operations necessary to accomplish these activities involve issuing and promulgating allocation control orders, issuing shipment control orders, and possibly activating a rationing system. To conduct these functions effectively, the state must collect and analyze information, draw conclusions on the situation, devise alternative courses of action, decide which alternative is preferable, and inform those who need to know. The state may also be required to supply situation data to the federal government.

As noted, of the many goods and services normally provided, relatively few are essential to survival during an emergency evacuation. Exhibit A.1 lists items and services considered essential for a nuclear crisis relocation. The characteristics of the major categories are discussed in the following paragraphs.

A.4 MEDICAL SUPPORT

Most doctors, nurses and other private medical personnel will relocate to host areas along with the general population. Some hospitals will remain in operation in risk areas to serve special requirements. Some state and federal medical facilities will operate as separate institutions or as part of other institutions. These should be assigned direct roles to local jurisdictions either on a committed or contingent support basis.

Medical supplies and equipment are likely to be limited in host areas. Some medical supplies of the "home remedy" and personal hygiene type are normally provided by the food and pharmaceutical distribution systems. These will move through normal channels. Special drugs and sensitive equipment require special handling. Because they do not involve large bulk or weight, risk area wholesale stocks can be relocated to sites at or near host area medical centers.

A.5 FOOD SUPPORT

Food supply and distribution is basic to sustaining the evacuated population, and may constitute the bulk of the redistribution load. Private control of food operations can be expected to continue during emergency evacuation. Strain on the national distribution system will be minimized if corporate chains are preserved as supply and distribution units. Host area retail stores, restaurants and institutions should continue to be supplied by their pre-evacuation sources. State operations should be addressed primarily to wholesale and consumer elements of the distribution system.

State-level food resource support will:

- Determine food requirements in terms of use rates and geographical locations;
- Determine the capabilities of the existing food supply and distribution system;
- Select appropriate operational systems; and
- Organize, deploy, and establish procedures for state emergency operations.

EXHIBIT A-1

ESSENTIAL SUPPLIES AND SERVICES FOR CRISIS RELOCATION

Health Supplies and Equipment

- Pharmaceuticals
- Blood Collecting and Dispensing Supplies
- Biologicals
- Surgical Textiles
- Emergency Surgical Instruments and Supplies
- Laboratory Equipment and Supplies

Food

- Milk
- Meat and Meat Alternatives
- Vegetables and Fruits
- Grain Products
- Fats and Oils
- Sugars and Syrups
- Adjuncts

Body Protection and Operations

- Personal Hygiene

Electric Power

Fuels

- Petroleum Products
- Gas
- Solid Fuels

Source: Reference 2

Sanitation (Including Sewage Treatment) & Water Supply

- Water and Sewage Treatment
- Water Supply & Sewage Treatment Materials
  - Coagulants
  - Disinfectants
  - Miscellaneous
- Insects and Rodent Control Materials
  - Insecticides
  - Rodenticides
- General Sanitation Materials

Housing and Construction Materials and Equipment

General Use Supplies and Equipment

- Batteries
- Tools
- Construction Equipment
- Trucks
- Portable Lighting

Transportation

Telecommunications

Defense-related Production and Services

A.6 ELECTRIC POWER SUPPORT

Electric power generation and distribution systems are usually interconnected, so overall capacity will probably be sufficient. However, the amount of power available in any location is limited by transformer capacity. Little can be done during an emergency evacuation period to add to main distribution substation capacity, due to lack of availability and difficulty of installing large transformers. Minor adjustments may be possible. Therefore, the electric power system is typically limited to its normal capacity.

The electric power utilities have unique information about their systems and operations; they know the limits of their flexibility; and they are experienced in dealing with emergencies. The role of the state will be limited to informing the utilities of the magnitude and extent of population and organization relocation, and in the promulgation of conservation measures.

A.7 FUEL SUPPORT

During a nuclear crisis emergency evacuation, it is expected that the federal government would allocate primary fuel production and supply. In general, primary stocks are those either in the hands of the producer, in transit between the producer's facilities, or in transit by common carrier. Secondary supplies in the hands of wholesalers or distributors would be subject to state allocation. The level and degree of control would be determined by the extent of the hazard conditions. Fuel is typically divided into four categories: petroleum, gas, liquified petroleum gas, and solid fuel. The production, distribution and consumption patterns for each of these categories tend to be separate from each other.

The petroleum production and distribution system has relatively few large producers with integrated distribution and wholesale storage facilities. There are a large number of retailers and consumers with relatively small storage capacity (except perhaps large industry or utility facilities). The primary role of the state would be to allocate supplies and limit consumption by controlling the petroleum users.

Gas production and distribution is relatively fixed by pipeline capacities with limited network storage. The role of the state will be to control operations of gas users.

Liquified petroleum gas production and distribution is like petroleum, although it requires pressurized vessels. It

is used as a gas, and may be an important source of fuel in some host areas. The demand problems resemble those for gas.

Almost all the solid fuel used is bituminous coal, and almost all the consumption is in electric power generation and manufacturing. Most users maintain substantial inventories on hand, so the role of the state would be limited to emergency reallocations.

A.8 HEALTH SUPPORT

State-level operations include support to localities in providing safe food and water, sanitary living conditions, and disease (vector) controls. Host area officials bear direct operational responsibility: It is hoped that this responsibility will have been considered in the allocation of evacuees.

Sewage disposal and maintenance of water potability are related, in that if sewage treatment facilities or septic tanks and cesspools become saturated, their effluents may affect normally potable supplies. This may require more frequent testing and additional personnel and equipment. Should corrective measures be required, the state may become involved in allocating both technical personnel and remedial chemical supplies.

Because crowding is inherent in emergency evacuation, communicable disease can rapidly become epidemic. Living quarters and food handling, preparation and service must be sanitary. Garbage and trash disposal should be adequately handled by host area resources, supplemented by risk area units. The state may be required to allocate personnel and supplies on a contingent basis.

Vector control involves the eradictation of disease-carrying organisms, such as insects and rodents. Proper sanitation measures (e.g., garbage removal) are major steps in vector control. Household materials (insecticides and rodenticides) are normally part of the food distribution system, and should be continued. Materials for professional use may require state allocation.

A.9 CONSTRUCTION AND GENERAL USE SUPPLIES AND EQUIPMENT

The general supply and distribution systems are similar to, although not as highly integrated, the food system. (Demand for food is continual and system failure could have seriously adverse effects.) For most general supply items, demand is "one-time" (e.g., hand tools may be needed to augment shelter, but once on hand they would last through the relocation -- and a supply failure would be inconvenient rather than critical). The federal government may assign high priority to supplying defense-related production and services during a protracted crisis relocation. These requirements must be integrated with population support operations. Typically, the state should expect to survive during the evacuation period with existing general supplies on hand. Therefore, its operating role will be to allocate and control their distribution.

Some items are small and in common supply (e.g., batteries, hand tools, and portable lighting). These could probably be distributed best by the food system. Other items could be important for emergency evacuation. Construction materials, equipment and tools are needed for shelter upgrading and expedient shelter. Trucks would be needed for increased transportation of supplies.

Much of the existing general supply items are in the risk areas, and would be needed in the host areas. Most construction materials, supplies, equipment, and spare parts are privately owned and stocked in specialized facilities. Experienced and skilled personnel and organizations are required for operations. Many items require unique transportation equipment. Coordination of these diverse elements may become a major state responsibility, requiring specialized engineering and technical skills.

A.10 TRANSPORTATION SUPPORT

Transportation support requirements are highly interactive with the distribution patterns of necessary supplies (e.g., the need to move food, fuel, pharmaceuticals) from secondary sources to the consumer, and the requirement to provide transportation for key workers who will commute daily from host area to risk area to maintain essential industries and services. It is expected that key workers will be assigned to host areas close to their work location, either in the risk area or the host area. Transportation requirements will also be determined by the type and number of vehicles and drivers chosen. The objective will be to minimize travel time and distance.

Essential supplies will be transported primarily from producers and wholesalers to consumer outlets by truck. In normal times, the capacity of distributor-owned and independent truck fleets is more than sufficient. However, an emergency evacuation would increase transit distances and times, probably increasing requirements for trucks and drivers. As noted, specialized moving equipment must be associated with construction activities. Transportation allocation, control and coordination may be a major state operational requirement.

A.11 TELECOMMUNICATIONS SUPPORT

Communications are required for all essential operations so that information about the situation or about problems can be passed up, and information about decisions and directives can be passed down. Information must also be passed laterally among the various organizations who must cooperate or whose activities must be coordinated. The need for coordinated, rapid action inherent in an emergency evacuation situation makes communication support crucial. The delivery of written messages by messenger services is slow and inefficient. The postal service is expected to be in limited operations, if at all.

There are extensive telecommunication networks and equipment to meet the normal needs of government, industry, and the public. Three kinds of operations should be considered: first, transmission of information within the state organizations, between the state and local government, and among local governments. The second is for transmission of information within and between essential industrial activities. The third is for informing the public by both state and local governments. State support operations should include actions to interconnect the systems and to provide a central point of control for the integrated network.

Overall direction and control operations would probably function at the state EOC. Major state support elements might function at sites distant from the EOC and from each other. Communications will be required between these organizations. Local government will provide information about the situation and their requirements, and the state will provide information about policy and necessary actions. Thus, communication will be required between local government and the state government and its major support elements. Mutual aid between adjoining local governments will be necessary, so adjoining local jurisdictions will need communication to coordinate their activities. Communications between separate local governments may be best managed through the state.

Because maximum reliance will be placed on private industry to produce and distribute the goods and services during the relocation period, industrial activities must be able to pass necessary intracompany and intercompany operational information. There must also be communication between industry and government. Industry needs to inform government as to its condition and requirements. Government must inform industry as to the general situation and its actions to control resources.

A.12 EMERGENCY PUBLIC INFORMATION

Emergency public information refers to those instructions and guidance that would be disseminated through the mass media and organization channels at or very near the time emergency evacuation is directed. (Clearly, it would be beneficial to have communicated general information regarding the relocation prior to the emergency.) Emergency information must be transmitted to the public so that it can be advised of the general situation and of what should be done to withstand the hazard effects. In addition, the public needs to be reassured that appropriate measures are being taken, and needs to be motivated to do what is expected of them. At the state level, it is particularly important that the governors be able to speak directly to the public. Therefore, a statewide network should be available to the governors.

At present, civil defense contingency plans include in place protection as well as emergency evacuation. Many people find it difficult to think about contingencies and alternate plans, especially when the alternatives are not a matter of local or personal choice but a matter of state decision. Communication of civil defense information is complex, and must be handled both candidly and with great care. Basic emergency evacuation instructions consist of information on when to start, where to go, and what to do. This information will make sense to the recipients only if it is compatible with their other personal concerns and with general reports on the crisis on television, radio and in the newspapers.

There are three key audiences which require emergency evacuation instructions. These are: (1) the government agencies, private businesses, and institutions that have been designated essential industries or services and will remain in operation during the evacuation period; (2) persons requiring public transportation; and (3) the remaining general public that will move by automobile. The first group should get their instructions and supporting information through the organization with which they are connected.

Typically, this information would be distributed through normal organizational channels. The general public, including those without private transportation, will receive their instructions mainly through the mass media. This information should include instructions on where to relocate and what to take, together with supporting information on what to expect in the way of traffic problems, arrangements for reception and care, protection of property, and the like. The groups requiring public transportation will need specific information on pick-up points and schedules.

Experience has shown that the public has difficulty understanding and retaining instructions gained from radio or television. Printed instructions are the most reliable means of informing the individual on what he is to do. Thus, a newspaper supplement or its equivalent will be necessary as the basic communication. Materials for the broadcast media should be based on the printed material, and should reinforce it and amplify particular aspects of the information.

A.13 ECONOMIC ASPECTS OF EMERGENCY EVACUATION

The relocation of urban populations poses obvious economic dislocations. Though many persons would continue to perform their normal jobs and others would work at emergency tasks, many normally employed persons would find themselves without their usual source of income. Similarly, many businesses and industries, both in risk areas and in host areas, would be unable to operate. Continuing to pay salaries and wages would be impractical for many businesses and governmental organizations. The preparation of payroll vouchers, normal banking facilities, and mail delivery would be curtailed.

The financial and economic operations of federal and state governments will be particularly sensitive to the nature, extent and duration of the emergency evacuation. Though it is unlikely that government actions will be made explicit prior to the emergency, partial predictions can be made from previously developed regulations and traditional government roles in large-scale disasters, wars and similar emergency situations.

The provision of housing and other essentials, including food and medical care, would probably be at the expense of the government for relocated families and many host area families as well. If the evacuation lasts only one week or so, these problems would probably not be severe. If a war crisis is peacefully resolved, provisions would probably be made to compensate individuals for losses entailed by the relocation and to provide government credit to businesses

whose loss of cash flow has placed their continued existence in jeopardy. In other words, an equitable sharing of losses resulting from crisis relocation would be brought about through the federal authority. Although the details of such arrangments may undergo elaboration during the crisis and after relocation, it is anticipated that no one would be denied the necessities of life through inability to pay, and that the continuity of businesses and other institutions would be protected.

Appendix B

RISK AREA OPERATIONS

B.1 CONCEPT OF OPERATIONS

The basic concept for emergency evacuation operations presupposes adequate warning time and an official decision and proclamation for the evacuation over the in place countermeasure. It also involves definition of the risk area for emergency hazards. For the nuclear crisis relocation case, the federal government with state participation has pre-designated risk areas. It has also decided which minimum activities appropriate to an emergency situation will be continued in the risk areas by commuting the essential workforce from nearby host areas. Although, under some crisis circumstances, higher authorities might permit some essential workers to remain in the risk area during off-duty hours, the basic concept is to assume that all risk area workers return to host areas for their off-duty hours. To minimize commuting requirements, risk area essential facilities will be operated on a two-shift basis, each of 12 hours duration.

Operations will be controlled by officials of the risk area organizations. Operations are interruptible, except where shutdown time is time-consuming, dangerous or costly. Thus, food distribution and banking are interruptible. Oil refining and steel production are uninterruptible because of shutdown times and costs. Operations of residential facilities and public safety forces are also uninterruptible. For interruptible operations, the essential workers would relocate with their families to the host areas and then resume operations by commuting back to the risk areas after the evacuation was completed. Uninterruptible operations are maintained by continuing the work shift on duty, and accomplishing relocation during off-duty hours.

Risk area operations will be organized around clusters of operating facilities. A staging area will serve each cluster and provide on-shift feeding, emergency medical care, vehicle refueling, emergency repairs, and general support to risk area operations. A second set of operating facilities

will be at ingress control points to the risk areas. These control points will limit entry to the risk area, provide transportation support, and act as a secondary bases for the public safety forces (in addition to the staging areas).

The general scheme envisions that the decisionmaking officials of essential risk area organizations will operate from protected facilities (as an EOC) within the risk area, will commute as other essential workers, or will relocate to alternate headquarters outside the risk area. Choice between the alternatives will depend on assessments of hazards, the particular role of the essential organizations, and the conditions of the headquarters and possible alternative facilities. It is necessary that the vital clearinghouse functions be preserved. This is especially important because most headquarters of areawide organizations are located in potential risk areas.

B.2 RECEPTION AND CARE OPERATIONS

As discussed in Appendix C, host area reception and care will require large numbers of personnel skilled and experienced in dealing with people. Risk area government employees not required for other emergency assignments are a preferred source of personnel for this function. Employees of risk area school systems are the largest pool of reception and care staff, especially teachers and administrative staff. Risk area welfare and social service employees, though not so numerous, are also readily identified and appropriate to the assignment.

Although reception and care is generally identified as a part of host area operations, it is likely that a substantial number of people may be in the risk area at any given time. These will include workers in essential industries and services, those people who cannot be moved for medical or other reasons, and those people who are unwilling to move. The total number of "stay-puts" will depend on the nature of local emergency operations and on individual perceptions of the feasibility or necessity of evacuation. The total number cannot be determined in advance, but may amount to 20% of the risk area population. Risk area staging areas are designed to provide support for the commuting workers. These areas could also serve the stay-puts for medical and logistical support. Because it is highly desirable to relocate the stay-puts to the host areas, only minimum services should be provided, and experienced counselors located at each staging area should give sympathetic and response attention to overcome the inhibitions from relocating to safer areas.

B.3 MOVEMENT CONTROL OPERATIONS

Control of the movement of people, supplies and equipment from the risk areas during the evacuation period will involve state, risk area and host area traffic control and public safety forces. Because the primary exodus will be by private automobile, control of vehicle movement will be necessary to assure orderly access to outbound routes, and smooth traffic flow once they are reached. To the extent possible, this movement control should be operated by existing traffic signs, traffic signals, and uniformed officers. The population is familiar with this system, so it should be left intact to minimize special information and surprises for the travelers. Where special control is necessary, the use of barricades and detour signs will reduce manpower requirements. Since movement control is an operational function of the law enforcement service, operations should be coordinated with host area sheriff's officers and local police departments, state highway police or highway patrols, as well as risk area police departments.

In addition to controlling the private automotive vehicle evacuation, risk area officials will have to coordinate local railroad and bus operations for both transit systems and school districts. Pick-up points will have to be arranged for autoless persons -- normally at neighborhood elementary schools. These schools tend to be well distributed throughout the risk area, and their locations are well known. A school can also provide temporary facilities for accommodating families awaiting transportation. Local school staff should be assigned the responsibility of operating the transportation terminals, and providing information on departure schedules. Special pick-up points should be arranged for residential institutions and, if necessary, specialized vehicles scheduled.

B.4 PUBLIC SAFETY OPERATIONS

Public safety requirements in the risk areas will probably increase during the movement phase and then reduce substantially during the maintenance phase. Force levels will depend on factors unique to each risk area: the number and size of essential operations, the number of stay-puts, and the judgement of the risk areas public safety officials. The three major functions of the law enforcement agencies include:

Traffic control;
Private property and personal security; and
Protection of essential industrial sites.

During the movement phase, major operations will include expediting the flow of traffic, detecting and correcting traffic problems, and assisting at the scene of automobile accidents. The movement of priority traffic and the enforcement of traffic restrictions will also be primary responsibilities. The law enforcement forces will monitor movement operations, provide status information to other officials, and provide security for essential organizations and key individuals.

The extent of law enforcement operations during the maintenance phase will depend in part on the number of stay-puts. House-to-house enforcement of relocation is deemed neither possible nor warranted. The law enforcement agencies will be responsible for implementing public policies, such as curfews and restrictions on the distribution of food, fuel and other resources. The police will also be responsible for security of private property from burglary and looting. Sensitive retail establishments such as food, drug, liquor, and jewelry stores will require special surveillance.

During the movement phase, fire services will concentrate on detecting and suppressing fires. Fire incidents may increase because of the rapid vacating of residences without adequate personal safety precautions. In addition, risk area fire services may be called on to support police forces in rescue operations, medical support, and the suppression of vehicle fires.

The character of fires in the risk area will probably change after evacuation. With population evacuation, people-initiated fires should be substantially reduced. However, people also provide an early detection system for fires. Therefore, those fires that do occur can be expected to be more severe, requiring larger response teams that will often concentrate on protecting exposure and knockdown techiques rather than the usual efforts to save the structure itself.

Both police and fire forces will be required to support essential industry operations. Auxiliaries and trained volunteers may be suitable for security functions at less sensitive facilities and as the second member of two-member teams. Public safety forces will also be required at the access control points. These may serve as intermediate redeployment bases for equipment and supplies, as well as rendevous points for commuting public safety personnel.

B.5 MEDICAL OPERATIONS

During the movement phase, the major risk area medical operations will be devoted to providing host area medical support and to the relocation of institutionalized patients and handicapped persons. Some emergency medical support will be required in the risk areas to provide health care for non-transportable patients. An additional responsibility will be to provide mobile medical support along the evacuation routes and to the rest areas in the risk area. It is probable that hospital resident physicians, nurses, and employees of the risk area health agencies will assume responsibility for medical operations in the risk area. This will free medical personnel in private practice to relocate to the host areas.

During the maintenance phase, most medical activity will be conducted in the host areas by the relocated medical and support personnel. In appears desirable for at least one major risk area hospital to be kept operational for the care of intensive care and cardiac care unit patients. Some medical support will be required at the staging areas and at the access control points. These medical personnel and mobile medical support units could be supported by the central hospital. Medical staff for risk area operations, as during the evacuation phase, could be provided by the resident hospital staff and public health officials.

Public health support in the risk area should be minimized by the relocation of the population. Surplus personnel could be assigned to the host areas for the analysis of potable water and sewage treatment, and for the inspection of lodging and mass eating facilities. The need for trash and garbage collection will also be minimal. As with other public health support units, these can be relocated to the host areas in accordance with the redistribution of the population. It is desirable that they move with their organizational personnel and equipment assigned as operating units.

B.6 RESOURCES AND SUPPLY OPERATIONS

During the movement phase, it will be prudent to continue to make essential goods and services available to the relocating public. The most sensitive retail outlets will be food, drug and gasoline establishments. Many retail store employees and service station attendents may be expected to be among the first to evacuate. However, there are sufficient outlets that, by extending hours of remaining employees and management personnel, most emergency demands can be met.

In addition to the supply aspects of movement support, there will be a continuing smaller and more specialized supply requirement during the maintenance phase for essential industries and the resident facilities. Although the allocation of these supplies is the function of higher government, risk area personnel will be called on to to implement the necessary distribution. Because the major allocation decisions will focus on the host areas, risk area officials should be sensitive to supply needs and fuel requirements for risk area based operations. In addition, most essential operating facilities are normally dependent on various local or regional suppliers for materials, replacement parts and services. Most of these normal sources will be closed down after evacuation. Personnel should be designated who are competent to respond to urgent and impending needs, who know where materials and equipment are likely to be found in the risk area, and who are prepared to call on statewide resources when necessary.

B.7 SHELTER OPERATIONS

For most types of emergencies, population relocation itself is the major countermeasure against the hazards. Under conditions of short warning, which preclude population relocation, it will be necessary for the populace to seek the best available shelter. Before the onset of the hazard, increased protection can be accomplished through building modifications.

For nuclear war crisis, hazards in the risk areas will be the combined effects of blast overpressures, fires and residual fallout. Although the need for protection for key workers is beyond dispute, there is substantial controversy regarding what should be done for the stay-puts. It is argued that all citizens, even those who do not follow official instructions, have an inherent right to be protected from the effects of a disaster -- whether nuclear or natural. Furthermore, if the stay-puts are not provided for, they may well compete with key workers for shelter and other resources in a disruptive fashion.

The sources of all-effects protection in the risk area are provided by the inherent shelter identified in the national shelter survey, upgrading existing buildings and constructing expedient shelter. Assuming that only 20% of the normal risk area population will be in the risk area after relocation, it is likely that all the stay-puts and key workers could be located in identified all-effects shelters, which would provide significant fallout and overpressure protection. Additional shelter could be provided by upgrading existing buildings and constructing expedient

shelters in the risk areas. Recognizing the uncertainty of identifying higher and lower risk sections of a target area, it would be prudent to locate construction sites for expedient shelters in areas removed from potential attack targets. The site selection should be within the ten-minute travel time from the key workers' employment locations.

Appendix C

HOST AREA OPERATIONS

C.1 CONCEPT OF OPERATIONS

Emergency population evacuations may result from short warning events such as transportation accidents, spills of hazardous materials, or earthquakes; they may also result from relatively long warning events such as nuclear crisis relocation directed by the President or State Governors. Regardless of cause in all cases, host area operations will require provision of temporary lodging and feeding of the relocated population, and such support operations as traffic control, medical care, and fire and police security measures.

Although carefully drawn pre-emergency plans and special training will significantly improve operating capabilities, host area officials will be subject to uncertainties as to the extent, duration and severity of the emergency. They will also be uncertain as to the kinds and magnitude of external support for the local operations. There will be persistent realizations that the emergency threatening the risk area, or a related emergency, may threaten the indigenous population. These uncertainties will tend to bias host area officials to austere levels of operations, while maintaining maximum flexibility and local self-sufficiency.

In this context, the following paragraphs explore the host area operating requirements to support the relocated populations. Some needs may be met by resources and personnel available within the host areas, some by supplements from the general relocatee population, and some from risk area and state resources. Crisis relocation resulting from a nuclear threat will be the base case for the discussion, because it is likely to be a worst-case example and because extensive research has been accomplished for this condition.

C.2 RECEPTION AND CARE

The primary host area requirement will be the reception and care of the relocatees. The ability to house and feed the relocatees is the basic consideration to the feasibility of the emergency evacuation operation. Civil defense policy in nuclear crisis relocation is to house the relocatees in public congregate care facilities (e.g., schools, stores, hotels, motels), rather than in private residences. This approach anticipates the most severe reception and care burden for host area officials. It ignores the experience and research, which indicates that a large portion of the relocatee population would move to private homes of relatives or friends, and that many host area families would be willing to share their homes. It is apparent that all host area operations will benefit from the maximum use of private residences for reception and care. An initial function of government officials should be to encourage and facilitate this course.

For those relocatees who do not move directly to private residences, the principal requirements for reception and care are to:

- Receive and register the evacuees;
- Provide housing in congregate-care facilities;
- Feed the relocated population;
- Provide necessary services and facilities for the aged, infirm and other populations needing special support.

In addition, host area officials will need to:

- Provide other essential services to the relocatee population, such as medical care, police and fire support, and public utilities; and
- Provide shelter for the relocatee and resident populations should there be a fallout hazard.

The civil defense guides for crisis relocation contingency planning and their backup documentation specify methods and organizational structures to accomplish the reception and care functions. Extensive surveys of congregate-care facilities and fallout shelters are being conducted along with the federally-supported crisis relocation planning. In addition, many local areas have community shelter plans (for in place shelter) and various locally derived emergency plans based on their vulnerability to natural hazards. Even with minimal prior planning and

short warning, analyses of past responses to natural disasters lead to the conclusion that most host areas could rapidly designate congregate care facilities and feeding establishments. Should the emergency be prolonged, it is expected that these designations could rapidly be improved to adjust to the relocatee load.

The manpower requirements for organization and staffing for reception and care are extensive and, except in most general terms, have few counterparts in our society. At the same time, limited specialized technical knowledge is required. The typical recommendation is that the staff be drawn from personnel of the school systems and welfare agencies. There are a relatively few professional Red Cross personnel and some state personnel with extensive training and experience who are commonly employed during natural disasters of moderate intensity. For a major natural disaster or nuclear crisis relocation, the host areas would have to operate on an ad hoc, self-help and self-training basis. Additional manpower could be recruited from the relocatees. Even in areas with extensive emergency evacuation planning, it is unlikely that a trained, designated organization could be maintained to provide for reception and care. This does not appear to be an acute problem for host area officials, even during the movement phase of the relocation. They can expect the vast majority of the relocatees to be cooperative and self-organized. Should the evacuation be prolonged, problems may emerge with militant or criminal groups requiring special treatment or police control. It is likely that outside authorities should be called on to deal with these groups, because host area capacities will be saturated with other problems, and because state and risk area forces will have had more experience with these types of problems.

C.3 MOVEMENT CONTROL

Private automobiles will be the major transportation mode to move the risk area relocatees to the host area. Buses will be an important secondary mode, particularly for those segments of the population without their own transportation. Trains, airplanes, and waterborne vessels will be used for special applications.

The designation of routes from the risk areas will be controlled by risk area or state personnel, as will the utilization of the secondary modes of transportation. Control of movement on the major interstate and state highways will be accomplished by the state highway patrol forces. The host county highway patrol (sheriff's units) will cooperate with state highway patrol forces to provide

services at rest stops and refueling points, and to clear highway accidents. County police and highway department personnel will also play a major role in controlling the egress of the relocatees from the major arterials to the reception centers of the host areas. Host communities will be required to assume control of the relocatees on entrance to the jurisdiction; they will be responsible for the routing to the reception centers and for subsequent control.

The level of planning and the type of hazard that generates the emergency relocation will be important to host area operations. Local hazards, such as toxic material release, may require rapid response, but are generally local in their extent, and allow force augmentation from higher government levels and from adjacent areas. For these cases, the numbers of relocatees tend to be relatively small. Emergency relocation generated by hazards of large extent (for example, a nuclear crisis or major hurricane) will involve many more relocatees, but inherently provide a longer buildup and warning period. This allows a longer time for preparation and movement. In these cases, the emergency forces will be stressed to control the evacuation movement, and local officials will have to operate primarily with their own staff, augmented by predesignated auxiliary personnel. In contrast to the reception and care personnel, the police forces are trained, coordinated, and experienced to handle the movement direction and control on a day-to-day basis. They have established jurisdictions and operating procedures, and are familiar with their local problems. Both research and past experience with natural disasters indicate that movement direction and control, though a difficult operation, can be expected to operate efficiently.

The rescue function is also anticipated to increase in host areas during the evacuation movement phase, resulting from increased numbers of automobile accidents along the evacuation route. Similarly, it should be anticipated that there will be an increased need for mobile medical support. These added requirements can partially be met by more intensive use of host area resources, and partially by mutual aid-type support from risk area forces.

The arrival of the relocatees in host communities will usually triple or quadruple the usual number of vehicles in the area. Much congregate care space is concentrated in the business districts of the host county communities. Registration centers should provide temporary parking facilities. Thereafter, the relocatee vehicles should be assigned to designated parking areas. It is considered desirable to have these parking areas accessible to the congregate care facilities. This allows the potential driving of the vehicle, and enables it to be used as a storage facility for personal property and pets that the

relocatees have brought with them. A continuing requirement for host area operations will be to provide control and security for the vehicles. It is generally agreed that this can be accomplished by police auxiliary personnel.

Various control measures for movement within the host area and to the risk area are discussed in the civil defense crisis relocation contingency planning. Whichever plans are adopted, their implementation will be the responsibility of the host community officials and police force. It is expected that state and county highway personnel would be responsible for control of the emergency traffic into and out of the risk areas.

C.4 PUBLIC SAFETY

The following paragraphs discuss the operations of the law enforcement and fire protection forces during the maintenance phase of emergency relocation. The major increase in the population of the host communities will result in greater law enforcement requirements, and in special problems for fire protection forces. Providing additional public safety capability to host area communities is a difficult and controversial issue that must be resolved at the local level because of differences in the operational, legal and political requirements of host and risk area jurisdictions; local problems resulting from the composition of the populations; the nature of the hazards; and past relations between the jurisdictions.

The dispersion of risk area public safety forces to act as fillers for host area forces will present organizational and control difficulties, weaken the integrity of risk area forces, and involve frustrating allocation problems. It is likely that in many areas, the host jurisdictions can establish adequate public safety support with the augmentation of local auxiliary personnel. The commitment of the sworn peace officer or the trained fire fighter is often unnecessary. For many operations, local public safety officials should view their forces as a leadership cadre; many actions could be implemented by auxiliaries. State and risk area public safety forces could be used as contingent reserve units, in the mutual aid context, to efficiently respond to special host community emergencies. The law enforcement functions can be characterized as follows:

- Traffic control;
- Property and personal security;
- Criminal investigation; and

- Maintenance of detention facilities.

In each of these categories, many of the routine police functions can be deferred or reduced in scope for the emergency period: issuing traffic citations, serving warrants, investigating accidents, training, etc. For traffic control, law enforcement forces will have primary responsibility for internal host area movements and for flow from the host to the risk areas. Uniformed officers will be particularly effective for highway patrol, traffic control points, and rest areas. Auxiliary personnel may be used for local traffic direction.

Augmented security forces will be required in host areas for neighborhood patrols, for security of food and other essential resources, and for the relocatees' parking areas. They will also be required for each of the congregate care facilities. It is assumed that much of this workload could be borne by auxiliary personnel.

Despite preventive measures, incidents of crime will undoubtedly rise in the host areas. This will be the responsibility of the host area county and city police forces. Should they be saturated, they could be augmented by appropriate task forces from the risk area jurisdictions. It is difficult to determine in advance the increase in the workload in detention facilities. The disposition of risk area prisoners should be the responsibility of risk area officials.

Fire protection and rescue operations during emergency relocation are generally the same as those performed in normal operations:

- Fire prevention;
- Fire suppression;
- Rescue; and
- Mobile medical services.

Host community fire prevention activities will be increased substantially due to the increase in population and the conversion of non-residential buildings to lodging facilities. Initial and continuing inspections should be made to identify and correct hazardous fire safety conditions. At the same time, the relocatees should be instructed in fire safety techniques and educated on what to do in case of a fire. It is difficult to judge the anticipated higher incidents of fire, since there are no

generally accepted standards for the congregate care situation. Thus, the final determination on increased requirements must be made by the local fire service agency. Much of the workload should be met with auxiliaries.

C.5 MEDICAL OPERATIONS

Providing medical support during emergency relocation presents substantial problems for host area officials. Many host counties are deficient in health care resources compared to urban risk areas, even for their indigenous population. The concentration of large numbers of relocatees in congregate care structures not intended for housing, crowding, limited sanitation facilities, and mass feeding all indicate a likely increase in the incidence of many diseases. Moreover, the relocatees are separated from their normal sources of health care and medical supplies. Accidents and stress conditions leading to heart attacks and nervous disorders are likely to be more frequent. Host area medical support involves three types of operations:

- Movement phase emergencies;
- Current patient load of the chronically ill and aged; and
- Health services for the "normal" population.

During evacuations of relatively short duration, short warning time and local extent, the normal practice is to use the emergency facilities of hospitals and medical staff in contiguous areas. For longer duration emergencies, physicians and nurses relocate to the host areas, and are assigned to medical facilities there. The loss of efficiency resulting from the relocation should be compensated for by deferring non-critical treatment.

During the movement phase, mobile medical aid to serve vehicle accidents and other emergencies is normally the responsibility of private ambulance companies or the fire and rescue service, although law enforcement agencies may be responsible in some counties. Provision should be made to move some ambulances and medical support to the rest areas to care for emergencies. Movement phase emergencies close to risk areas could be handled by mobile units from the risk area, temporarily utilizing the emergency facilities of risk area hospitals.

At any particular time, it is estimated that an average of about one percent of the population are receiving medical

care as patients, residents or inmates of hospitals, convalescent homes, or other institutions of specialized care. Considerably more are under medical treatment in households. It is expected that host area officials will accomplish last-minute arrangements for the use of appropriate facilities to care for the specific needs of the chronically ill, aged, or other patients.

For the "normal" patient load, it may be expected that physicians and other medical professionals would be located at host area treatment facilities and the patients brought to them. It is also important, however, that surveillance be established in the congregate care facilities with appropriate medical personnel on the scene. Host county residents would continue medical services by their usual practitioners.

Public health measures include analyses of potable water supplies, sewer treatment effluents, inspection of mass feeding facilities, collection and disposal of trash and garbage, and vector control. Host area health staff may be augmented by risk area and state personnel to assist in these measures.

C.6 RESOURCE AND SUPPLY

This section deals with the operations required for providing and maintaining control of essential goods and services during the evacuation maintenance period. The effect of economic controls is also discussed. Two factors differentiate this function from those discussed earlier: most resources and supplies are under private ownership and control, and the criticality of the function is vitally tied to the extent and duration of the emergency. Should the hazard be limited in extent, there are adequate supplies in adjacent areas to fulfill the needs of the relocatees. Should the emergency be short in duration, adequate supplies exist in the resupply pipelines to allow diversion to the host areas. In addition, in the short run the consumers can be expected to adapt and reduce their consumption patterns to available supplies. Essential supplies and services, designated for nuclear crisis relocation, were listed in Appendix A. The following discussion is directed toward host area needs for a large-scale, long-duration relocation.

Supplies of drugs, pharmaceuticals, and other health supplies will be delivered to normal host area users or retail outlets by their usual suppliers. Local wholesalers may be involved, with hospitals, clinics, and pharmacies typically the delivery points. Quantities and types should be based on the total estimated resident and relocatee

population. Security will be required for control of drugs, scarce or dangerous health supplies, and for fragile or specialized equipment. Modifications of normal supply distribution patterns will require decisions by higher authorities.

Deliveries of food and associated products will be made by normal suppliers to normal retail outlets or users. Large food chains and wholesalers will continue to supply their outlets in the host county. Institutional suppliers will continue to supply institutions and commercial eating establishments. Food distributors who normally supply risk area but not host area outlets constitute a flexible supply source to accommodate the uncertainties of the numbers of people who will be in private residences versus those in congregate care facilities.

Procedures for accounting and paying for drugs, food and other essential supplies and services will be defined by state and federal authorities. Generally, a recordkeeping process will be adopted for use in resolving accounts after the crisis in order to relieve pressures on the banking system. Some forms of rationing and price controls may be incorporated in the state plan for appropriate supplies and services. Host area officials will be required to implement whatever decisions are imposed by higher authorities.

Arrangements for the supply of electric power and fuels will be controlled on an area basis with the industries concerned. The distribution of motor fuel and heating oils will be of concern to host area officials, but allocations will be controlled at higher government levels. It is considered that the control of private vehicles through trip or use authorization is probably the best local solution to the control of motor fuel consumption.

Long-haul transportation of supplies and equipment to the host county will be coordinated by the state, as will commuting workers to and from the risk areas. The main transportation concern of host county officials should be the local distribution of essential supplies.

Other essential supplies and services, such as telecommunications and defense-related production, will be the responsibility of state and federal authorities. The whole area of economic and monetary controls and procedures is fraught with uncertainties for local area officials. It may be assumed that no one will be denied the essentials for life for lack of money. However, state and federal officials will probably determine their approach to these matters in light of the perceived emergency. It will then be incumbent on local officials and organizations to implement the decisions.

C.7 SHELTER OPERATIONS

Although the purpose of emergency evacuation is to remove populations from hazardous areas, a nuclear power plant failure or nuclear war crisis could subject host areas to fallout radiation. The following paragraphs discuss the host area operational requirements to enhance fallout protection during the crisis relocation period. Needless to say, planning and preparation prior to the crisis relocation would be beneficial.

The crisis relocation contingency planning involves the identification of fallout shelters in host areas. The general rule is to use the best shelter available. Many congregate care facilities will not have shelter protection, although facilities with fallout shelter protection often contain congregate care space. Because of the different planning factors used in defining these spaces -- 40 square feet for congregate care and 10 square feet for fallout shelter -- these facilities have more shelter capacity than congregate care facilities. Host area officials may be required to accomplish a second movement operation for the evacuees. Shelter facilities must also be managed and stocked with survival suplies -- food, drugs, sanitation equipment, etc. This would place additional demands on already scarce resources. These problems are further complicated because each host community also may have different in place plans to shelter its indigenous population in case of an emergency without warning.

Faced with a potential radiological fallout hazard, each community would have strong incentives to upgrade shelter protection to the maximum extent possible. Protection factors for many fallout spaces could be substantially improved by adding cover or providing ventilation. Normal construction activities in host areas will generally cease at the time of relocation, so personnel, equipment and supplies could be diverted to upgrading fallout shelters. Except for those resources already in the host areas and under the control of local organizations, it is expected that construction capabilities will be allocated by state government officials. While technical advice and assistance may be available from the state, it will be a local responsibility to provide the technical skills, equipment, materials, and labor to accomplish fallout shelter upgrading. Although technical studies have demonstrated that significant increases in protection can be accomplished, other research has yielded little confidence that this is a feasible objective that could be achieved by host area officials, especially for relocatees in public facilities.

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This final report describes the development of emergency organization plans and operations, other research studies, and recent disaster events were analyzed to determine management requirements, procedures and limitations. Several tasks were involved: Present emergency management capabilities were investigated to determine the status of organizations, hazard conditions, and plans and operations; emergency evacuation operations were analyzed at host area, risk area and state and federal levels; management requirements were determined for the various jurisdiction levels during the basic, movement and maintenance phases of emergency evacuation; emergency evacuation management requirements were compared to capabilities and deficiences were notes; recent major disaster events involving actual or potential evacuations were analyzed to learn differences between doctrine and practice; field tests were conducted with local government officials to explore and validate research findings, and to test the applicability of the Guide; a middle management center concept for large-scale emergency evacuations was developed and related to requirements. The feasibility of implementing the concept was explored; results of the analyses and field tests were evaluated and are incorporated in this final report.

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